THE
THEORY AND PRACTICE OF EDUCATION.

BY

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Extracts from the Prefaces to the First and Second Editions.

The syllabus for the "Theory and Practice of Education" of the L. T. degree examination includes so many topics and ranges over so many different subjects, that it is not possible to find them all adequately treated between the covers of one single volume. The conscientious student who attempted to read all the references suggested in class, lost himself in unessentials and failed to get a proper orientation of the subject. The easy going student who contented himself with taking note of what was said in the lectures, passed the examination but failed to reap the full benefit of the course. The present work is designed to meet the needs of both types of students, to guide the reading of those who are interested in classroom problems and to provoke interest in the others.

The lectures appearing in the following pages are substantially those delivered to my graduate class of the year 1923—24 brought up-to-date wherever necessary. Students of successive years have repeatedly asked me to print them for their benefit; but it is the present batch which took the practical step and underwrote the enterprise. This fact makes the number of errors that have unavoidably crept into the text a matter of secondary importance. But for the benefit of those others into whose hands the book may fall, a list of errata has been added.

While primarily devised for the student undergoing training it is hoped that the book will also prove of use to other members of the teaching profession. As Lecturer in Education I have been frequently approached by teachers for information on specific educational topics and for suggested readings. I hope that the bibliographies that I have appended in every case, would meet their need.

TRIVANDRUM.
Training College.
12th March 1927.

D. J.

The first edition of this book was a purely tentative one and the number of copies was limited. This and the favour that it has found with the public, has called for a second

edition within the year. I have used this opportunity to correct the errors in the first edition. But since, the present edition was hurried through the press at a great rate, it was not possible for me to do all that I would have otherwise liked to, in the way of correction, and improvement. The book is being used more and more for school libraries, and it was suggested that I should append a bibliography of books on Education suitable to be bought for high school libraries. This has been carefully prepared. I have also added a detailed " table of contents " as well as some pages on certain topics, which owing to over sight failed to find a place in the first edition.

TRIVANDRUM,
Training College
15th November 1927.

D. J.

preface to the Third Edition.

Since the second edition of this book appeared, the writer has spent two years studying Education in the univer-sites of the West. The major part of the period was spent in Teachers' College of Columbia University, in New York City, studying different phases of the subject under, Dewey, Thorndike, Kilpatrick, Gates, Pintner, McCall, Bagley, Monroe, Rugg, Boyd, Whitley, Johnson, Kandel and other noted educationists and in visiting notable schools all over the country. Then he came to the London Day Training College to study with Sir Percy Nunn and Dr, Burt and to visit the schools of England. This was followed by an educational tour through France, Switzerland and Italy. While the personal contact with famous educationists, has enabled the writer to appraise their ideas from their own points of view, the visit to the schools has enabled him to realise these ideas in the concrete, the net result being to infuse meaning into his studies of educational theory and to secure inspiration for his daily round of duties. The obligation to these great educators and their works is obvious throughout this book and is duly acknowledged and may it help the great body of Indian teachers to evoke an educational theory for its own country.

" TEACOL LODGE "
Park View Road,
Trivandrum
20th Aug. 1932

D. J.

Preface to the Fourth Edition.

The fourth edition is practically a reprint of the third, though substantial additions have been made. These additions have been mostly to show the major trends in educational theory, a knowledge of which I believe, is necessary for ensuring intelligent application to practice. Duringthe interval between the third and fourth editions, the writer had the invaluable privilege of studying the Travancore education system on the Reforms Committee, under the distinguished guidance of Mr. R. M. Statham M. A., I. E. S, C. I. E., now Educational Commissioner with the Government of India. As a consequence, he is convinced that the greatest need of the moment in India is to bridge the gap between educational theory and practice. That must be the work of administrators and teachers His humble duty, is to indicate the existence of the lag between theory and practice. Nevertheless, it has made the part dealing with practice to burgeon out.

Teacol Lodge, 5—9—35 D. J.

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THE

Theory and Practice of Education.

The Teacher's Professional Curriculum.

Fitch; Lectures on Teaching I.
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The education of a teacher must needs follow the requirements of his profession. These requirements are three in number. The teacher should concern himself with the physical welfare of his pupils. A sound mind on a sound body—*mens sana in corpore sano.* Hence the teacher should be familiar with the elementary principles of Physiology and with the methods by which bodily health is conserved and physical welfare promoted. Education is very often spoken of as being bipolar, influences passing all the time between the pupil pole and the subject pole. The teacher as mediator between the two should know both the subject and the pupil. As Sir John Adams has it "verbs of teaching govern two accusatives, one of the person, another of the thing as 'the Master taught John, Latin'.' The teacher, in order to do his work well, should know both John and Latin. Knowledge of John is written in the science of Psychology which the teacher should read, con and ponder. The knowledge of any subject whatever, is logical in character and so the intending teacher should be equipped with the logical aspects of all knowledge. The training of a teacher then should familiarise him with knowledge of a physiological, psychological and logical character.

It is necessary, however, to answer the preliminary question as to how far training can succeed in fitting a teacher to his profession. Its efficacy has not been universally conceded. To begin with, the practice of training

teachers for their profession has not had a long history. Education was for long not for the masses but only for the rich. Wealthy people had private tutors and the instruction being individual some of the problems which face the modern class teacher, had no existence for them. If a man knew his subject he was thought quite fit to impart it to others. The grammar schools got the lower order of university graduate, while the public schools got the better type. It was only with the Compulsory Elementary Education Act of England that teaching began to emerge as a profession. The pupils had to be educated in the mass. It was not sufficient if the teacher knew his subject: he may not be given a hearing. He had to be skilled in the arts of controlling a class and of presenting the subject in such a way as to be assimilated by all, both clever and poor. These arts had to be learnt. As the number of pupils educated suddenly increased, a large number of teachers were wanted. All sorts and conditions, the fit and the unfit began to flock into the profession. These had to be trained and thus training institutions came to be established to give them at least a fighting chance.

There were good teachers long before there were Training Colleges and on abstract considerations, some point out, that such colleges can do very little good. *Nacitur non fit* say they: the teacher is born not made. No amount of training and teaching can ever make an indifferent teacher into an efficient one. This is only a part truth. Even in those professions where native endowments count for most and acquired proficiency least, the advantages of training are well admitted. The painter of all people has to be born, but even the most original painter is not above schooling in his art and learning by copying the work of the Great Masters. To bring out innate gifts and to make them function some kind of training is needed. Therefore some acquaintance with the theory, history and rules of teaching would serve to turn a moderate teacher into a good one, a good one into a finished and accomplished artist and even those who are least qualified and are teachers merely "by the grace of God" into serviceable helpers.

Others say that teaching is to be learnt by experience and not by hearing lectures or by reading books about it. No

one ever learnt swimming by knowing the theory of it but by getting into the water and by beating hands and feet, keeping the head above the water. So too the teacher learns to teach by teaching. No doubt experience is the best school; but often it is second best The fees paid are apt to be very high and the course to be too long and tedious. All the time he is learning by the hit-and-miss method he is experimenting at the expense of pupils. The mistakes by which he learns may prove disastrous to them. Again it is part of the economy of life to learn by the accumulated experiences of others. Much of the experience, that comes slowly to a teacher may be easily primed into him in the forcing-house of a Training College. We can easily admit all three—innate gifts, study and experience—go to make the perfect teacher and we could define their respective spheres in the words of Bacon. "(Studies) perfect nature and are perfected by experience, for natural abilities are like natural plants that need pruning by study: and studies themselves do give forth directions too much at large except they be bounded in by experience." A Training College cannot give the insight into child nature, the living personality, the zeal, faithfulness and self-consecration that go to form the ideal teacher. But it can call attention to the principles of teaching, to the methods of gifted teachers in the past, can accumulate rules and canons of the didactic art, can warn against mistakes, can analyse the cause of failures and set a higher standard.

Still othes say that training would bring every one to follow one standard method and thereby put a stop to all variety, independence and initiative This would be deplorable if true. Variety and versatility are of the v ry essence of successful teaching The methods by which different pupils learn are different; different circumstances require different expedients. Originality and invention should mark every teacher so that he may be equal to every situation. But does training destroy such originality? In every branch of study, acquaintance with all the work that had been already done, is a precondition of originating new ideas This is true of Science, Engineering, Medicine &c; and it is also true of education. The pre-training-college days were marked by stereotyped methods which were hallowed by custom and tradition. It is only after Training Colleges were founded

that all kinds of new methods have been started. Sir John Adams in finding justification for calling the whole body of educational practice that has grown up recently, "The New Education" ascribed the plentiful invention of present days to the existence of a large number of Training Colleges.

Finally we should remember that teaching is a profession and not a mere trade or calling. The difference between a profession and a trade is the difference between medicine, engineering and architecture on the one hand and carpentering, blacksmithing and cobbling on the other. The difference consists in the amount of training needed in each case. It is longer in the professions than in the trades. This itself in turn is due to the fact that a profession is guided by fundamental principles and laws of nature, while a trade is guided by mere rules and directions Therefore one who follows a profession must be aware of the sciences on which the laws of his calling are based, while a craftsman need not be so aware. Under such circumstances the teacher ought to have a prolonged training.

Every profession involves both theoretical and practical aspects. For example, Medicine is ultimately based upon such sciences as Chemistry, Botany, Zoology, Anatomy, Bacteriology and Physiology. The sciences lay the basis of the professional study; in Medicine, Bacteriology, Anatomy and Physiology for Pathology; Botany and Chemistry for Materia Medica, Anatomy and Physiology for Surgery. Hence not merely the sciences, but also the applied sciences have to be studied. Not only that, the student must attend at clinics and must have some practice under guidance. Indeed a hospital appointment is growingly being considered the coping stone of a good medical education. Thus a training for any profession involves the study of some basal sciences, of a good amount of professional theory, and practice under guidance. In the case of teaching these three alone are not sufficient. Every member of the liberal professions should have broad culture; but this applies with particular force to the teacher. It is his business to transmit culture. Thus a fourth item is generally added to his curriculum in the shape of academic specialisation. For example, the teacher who is called upon to teach English should know some of the

ancient and modern languages and should also be familiar with some amount of history. This academic specialisation is achieved by means of professional reviews in which subject-matter is taught.

The basal scicnces with which the teacher should have a nodding acquaintance are:—Biology, Sociology, Philosophy, Logic, Ethics and Psychology. Education is a biological and sociological function. Therefore sociology enables one to understand the aim, meaning and value of education. Without Logic and Philosophy the nature of knowledge could not be easily understood and Logic is absolutely indispensable for a sure grasp of teaching methods. Ethics is wanted everyday in the class room and for appreciating the aim of education. Psychology is the link between the pure sciences and the applied science. In the shape of Educational Psychology it forms part of the Professional Theory of Education.

The professional subjects consist of a theory of aims values and content which goes by the name of the General Principles of Education. The teacher should be aware of the end of education and the varying degrees in which the different subjects help towards the achievement of the end, *i.e.*, tbe subject af educational values. The theory of imparting instruction and of developing character is now-a.days known as Principles of Teaching or Educational Psychology. The teacher should also be grounded in the history of education which gives inspiration, guides the choice of methods and puts the teacher *en rapport* with the educational world. Then there are the subjects of Class-room Management or Principles of Class Teaching, of School Hygiene and Organization. The practical aspects of training include observation lessons and practice teaching. Such should be the curriculum of a rounded course, for a teacher's training.

The Essential Qualifications of a Teacher.

Fitch: *Op Cit. Lect I.* *Horne*: *Psychological Principles of Education Chap. IV.*
Wren: *Indian Teacher's Guide.*
Bagley: *Classroom Management*

There are three classes of qualifications for success in the teacher's profession. They refer to character, ability to teach and knowledge.

It matters very little to the wood on which the carpenter is working what the character of the carpenter is. But it matters a great deal to the future of pupils whose minds the teacher is shaping whether he is a good or a bad man. Besides the teacher is before the pupils as a model to be followed. His likes and dislikes soon become their likes and dislikes, his peculiarities, manners and behaviour become theirs, in short, his character acts on their character. The teacher teaches not only by what he says and does, but very largely by what he is. Suggestion is at work. The students imitate his writing, dress and manners. Therefore the teacher s character is an essential qualification for his work.

The teacher should maintain a cheerful and happy temper. Nothing tries the temper so much as teaching but the teacher should be patient We want patience because the results of teaching come very slowly. We should have self-command because if we are impulsive and variable and do not obey our own rules, we cannot expect the pupils to obey them. We must avoid all petulence and acerbity of temper. In the presence of a choleric man the pupils suppress themselves and look sulky and unhappy. Often it happens that boys are punished disproportionately because something had happened in the teacher s private life to vex him. The case of the Village Schoolmaster of Goldsmith exemplifies many of these truths:—

"Well had the boding tremblers learned to trace
The day's disasters in his morning face;
Full well they laughed with counterfeited glee
At all his jokes, for many a joke had he;
Full well the busy whisper circling round
Conveyed the dismal tidings when he frowned.'

Flashes of temper effect injustice. Such injustice would breed injustice and the boys themselves would lose their sense of fairness.

The teacher should maintain a cheerful demeanour. With the clergyman or the doctor a certain measure of seriousness and gravity would be appropriate. But the intercourse of the teacher is with the young and the happy, and he would be wrong if he thinks that he should put on a forbidding and repelling appearance. He owes a duty to his learning in this respect. The boys see his dulness and seri-

ousness and look upon them as the natural outcome of his learning. Thus learning becomes repulsive in their eyes because of its concomitant seriousness and gloominess. He who has a cheerful appearance inspires confidence and provides easy access to children. (See Ian Hay: The Lighter Side of School Life chap 3.) He who takes part in their games, laughs and gambols with them, gets sooner an insight into child nature than even one who has the best intellect,

One other quality should be prominent in the teacher, viz., sympathy. Sympathy with children, their wants and their ways, is an essential qualification. This sympathy is at the bottom of the imagination which enables a person to see into child mind and to know what is going on there. This also means that the teacher should love his little charges To those who enter the teaching profession believing it to be a paying one, hoping to reap worldly rewards, it would prove a disappointment There is no calling so delightful to those who like it; none which seems such poor drudgery to those who enter upon it as a means of earning a livelihood. Teaching is the noblest of professions but the sorriest of trades. Therefore none but those who feel called to it by natural inclination, by a conviction of personal fitness and by a wish to dedicate themselves and their best powers to the service of the young, need enter it.

The second class of qualifications deals with the innate capacity of the teacher for his profession There are a few physical qualifications which the teacher ought to possess, chief among them being quick perception of eye and ear. The teacher should see and hear everything that is going on in the class room With this object he should take up such a position in front of the class from which he could see the whole class. There should be no obscure corners in which the pupils can escape the teacher's glance. All good discipline depends upon this characteristic of the teacher. If the teacher fixes with his eye the inattentive, or locates the corner where whispering is going on, soon there will be very few such cases to notice. The boys will give him credit for much more in the way of detection than he is really capable of. But if in the beginning he allows indiscipline to go on around him because he is unable to detect it, soon there will be too much of it. The pupils will begin to talk and play right under his very nose.

The teacher must also have a gentle but authoritative voice. The teacher's profession exhausts the lungs. The vocal organs become weak. Therefore it is necessary to economise the voice as much as possible This is not merely desirable but highly commendable A low voice not merely does not achieve less but it actually achieves more. You might have noticed that when you are taking lessons the voice of the first boy decides the tone of the whole class. In the same way the pitch of the teacher's voice fixes the tone in which the whole school work is done. If it is gentle then the class also does the work in gentle tones. If it is loud and noisy soon he shall have to shout above the whole class to be heard. A noisy school is never a good school and it misses the refining influences of a gentle place.

Another quality that should mark the teacher is freshness of mind. I have already indicated the necessity for this. Year to year and place to place conditions change. Pupils and classes change from year to year. In the changing circumstances if the teacher uses stereotyped methods he would not be adequately meeting the situation. He would be putting everything on the Procrustean bed. What is wanted is a sense of the concrete situation, readiness and alertness of mind and adaptiveness. For example a question misses fire, you must immediately make another on the spot and get the answer. A lesson never goes in the course which we had foreseen in the notes of lessons. We should therefore be prepared to change it, to suit the differing circumstances. If it is so for one lesson it is much more so in general method. We should follow its spirit rather than the letter, for the letter would lead us into verbalism. These are the reason's why freshness of mind should be a qualification for the teacher. Methods are not much in themselves, it is the living teacher that counts.

The teacher also should have great powers of narration and description. Much of our work lies in this direction and so we should prepare ourselves for it Some are born story-tellers and skilful *raconteurs*. They could tell a story well. They could seize the right point, lay the proper emphasis, choose the relevant and reject the irrelevant. The result is most impressive. Within certain limits this faculty could be cultivated. Choose fine pieces of description. Irving, Park-

man, Gibbon, Macaulay, Hugo would provide adequate choice. Watch your pupils' faces when you describe. Note what interests and what produces inattention. Look out for the kindling eye and the rising colour. In this way you would learn to interest your audience.

The third class of qualifications has reference to the knowledge which a teacher should possess. Jacotat once said, "He teaches best who knows nothing about the subject." Every one will easily admit that this is an eccentric statement. The teacher should know the subjeet he proceeds to teach. While this is universally admitted, it is very doubtful if its full significance has dawned upon all people. The teacher should have ample knowledge of what he is going to teach. Many think that if they knew but a littlo more than the pupils, that is all what is wanted. This is wrong. here is a great waste in transmission. You cannot impart the half of what you know. Every one is familiar with the phenomenon. When you are asked to lecture to an audience you suddenly discover that all the fine things that you wanted to say had evaporated. Besides no one who has not understood a piece of information can impart it to others. He should know it and much more than it. He should know its relation to other facts. He should have gone beyond the subject and read round it. It is a common experience that when you want to tell others what you have read or heard, you discover that something is wrong in the story and you break down. Therefore it is true to say that in this respect you should leave no enemy behind. Knowledge begets enthusiasm, gives self-confidence, secures the respect of the class and gives the right perspective. The teacher should not merely know the subject that he teaches, but must have wide general knowledge as well. He should know something of everything and everything of something.

The teacher should always be a learner. Otherwise he would lose sight of the methods by which new truths enter the mind. He would also fail to understand the difficulties of students. This is the reason why the tutorial system is said to be more successful than the lecture system. The tutor is himself a student and hence imparts truths with the enthusiasm of a discoverer. This is what explains the paradox that the young teacher is often better than the old.

But the teacher's learning should not become pedantry. The teacher is usually a misfit on society. You can easily tell him in public. His studied manner, precise speech and mannerisms always proclaim his profession aloud. He becomes an autocrat and can scarcely take contradiction. He

has not the give and take of the man of good society. This tendency can be righted by liberal studies, by work out of school and by keeping company with those of his age and attainments Charles Lamb says of the teacher. "We are never at our ease in the presence of a schoolmaster, because we know he is not at his ease in ours. He comes like Gulliver from among his little people, and he cannot fit the stature of his understanding to yours. He is so used to teaching that he wants to be teaching you."

Finally' the teacher should always prepare for his work even if it be only a reading lesson. He must select his examples and illustrations. They are always better for being thought out beforehand and rehearsed. However able and experienced the teacher, he could never do without this preliminary preparation. (See Wren; op. cit. Chap V; Bagley *Classroom Management* Chap. VII).

Is Education a Science?

Horne: Op. Cit. Chap I. Burnett: Essentials of Teaching Chap I. Rayment: Principles of Education Chap II. Karl Pearson: The Grammar of Science.

In what sense do we apply the term "principles" when we speak of Education? What do we mean by the "Principles of Education?' In ordinary parlance the word "principle" is used very loosely to cover a wide variety of meanings. Firstly, the word is often used to describe a personal prejudice. For example, a gentleman might say, "It is a principle with me not to subscribe to any missionary body". This is only true of himself Secondly, by a principle we often mean a rule of conduct. Burnett quotes a conversation between two anarchists where the one asks the other if he would give explosives to any one for the mere asking. The second says that his rule was never to refuse it. The other asks "is it a principle?" "Yes" says the second. Here there is a confusion between a rule of conduct and the principles from which it is derived. Thirdly, therefore when there is such a confusion we require in the principle the idea of rightness. We bring it to a moral test. Fourthly, a principle must thus be true. It should not only be believed in but it should be provable. The whole world before Galileo believed that the sun went round the earth. It was a principle with them until Galileo came and proved that the earth went round the sun. Hence fifthly, the mark of a principle is that it should have a certificate of universal validity. When it has got this we call it a Law. There are laws

which compel acceptance, e.g. a spade is a spade. This is a Law of Thought. There are other universally accepted truths which are statements of uniformities e. g., all men are mortal. These would allow of no exceptions. They are Laws of Nature. Then there are the Laws of Science which are statements of relations which are true in any number of cases, e. g., the Law of Gravitation. Such a Law admits of no exception. We do not use the term 'law' when we speak of education. The utmost we have reached to is "institutes", because the principles of education have not reached the exactitude required of "laws." They cannot claim universal validity. They are more or less like moral principles and religious principles such as "Honesty is the best policy", which consist of generally accepted truths and which determine the conduct of people to a certain extent. They cannot be proved like a mathematical law and they can be violated with impunity. Hence the Principles of Education are rather prevalent opinions than proved conclusions.

We have just now seen that we call the principles that make up the body of a science, Laws. The principles of education have not yet reached the stage when we could call them "laws". Hence many have denied that Education is a science. To know if Education is deserving to be called a science, we should find out what a science is. A science is a body of classified and verifiable knowledge. The knowledge must be grouped and arranged in some order and it must consist of knowledge that must be verifiable. Knowledge that would be accepted as truth by all, that has a certificate of universal validity, that could be proved to be true to the satisfaction of everyone, goes to constitute a science. Of such sciences there are two kinds, the descriptive and explanatory, and the normative. The descriptive sciences tell us what the fact is and what its causes are. The normative sciences tell us what the fact ought to be i. e., they establish norms or standards. Physics, History and Psychology are illustrations of the descriptive sciences while Logic, Aesthetics and Ethics would illustrate the normative sciences. We could concede that there is the possibility of a descriptive science of education. Students of education could observe, gather, classify, organise and verify facts. In this way educational facts might be studied scientifically. There is a growing disposition to deal with Education in this manner. Men like Bain and Royce have done pioneer work in this direction. Moreover the exact methods of science are being introduced into the study of educational problems. The statistical method has long been in vogue and the ex-

perimental method has been recently added. Laboratories have been established in a large number of places and there is no reason why Education should not soon bloom forth into a science. After all, all the sciences are not so exact as Mathematics. There are sciences like Sociology, Biology and Economics which could not predict future happenings. Education might be one such.

This brings us to the consideration of the question whether a normative science of education is possible. Can the science of Education lay down the law for all time? It cannot do so with any degree of certainty because of three facts—conditions change, individuals differ and because teaching is an art. We cannot lay down the law for all time because each phase of society differs from every other phase and the ideals of education are relative to the age in which they prevail. Besides human nature varies with different individuals. It is this that makes most of the social sciences inexact. The similarity between human beings makes generalisation possible, but their variation makes them faulty. No one could say that supposing conditions which faced Wellington repeated, the general in command would make the same decision as himself. This is what makes prediction in history hazardous. Conditions do not repeat in identical manner and the men differ. This brings us to the third consideration that teaching is an art rather than a science The function of a science is to pursue knowledge for its own sake. The function of an art is to apply scientific laws for practical purposes. A science is to know, an art is to do In this sense Education is an art because it has some definite function to perform. The distinction between a science and an art is the distinction between Chemistry, Geology and Botany on the one hand and Agriculture, Mining and Navigation on the other. While the former pursue truth for its own sake, the latter pursue some aim other than knowledge. In the case of the sciences the resulting knowledge has been formulated in the shape of laws which are made use of in the arts. Hence those arts which make extensive use of such basal scientific laws, are even called the applied sciences. But even those arts making least use of such general laws are based upon a body of doctrines which is generally known as the theory of the art Again even the pure sciences have their practical sides. Thus the chemist must learn the technique of laboratory practice. The practical side becomes more important naturally in the case of the arts. Hence the pursuit of any art implies both a systematised body of

knowledge drawn largely from the appropriate sciences and those elements of skill and empirical tact which constitute the practice of the art. It is in this sense that we speak of a Theory and Practice of Education.

In the case of Education the theory would have been more respectable and respected but for several considerations. To start with, theory waits on practice. The body of knowledge that goes to form the theory of a subject must be deduced from the practical pursuit of the art. The practice of education has not had a long history. For a long time it was looked upon as an appendage of the clerical profession and its national importance was overlooked. Again the psychology from which the theory was drawn proved to be faulty. The Faculty Psychology and Adult Psychology of an older date have gone down before Functional Psychology and Child Psychology and with them have crumbled down like a house of cards the theory built upon them. Thus one of the doctrines of the Faculty Psychology was that the mind could be developed just as muscles develop by gymnastics and so the curriculum was devised to give such a mental gymnastic. This resulted in the false theory of Formal Discipline. A false psychology therefore gave rise to the false idea that the curricula could be fixed by subjective considerations and not by the aim of education. Moreover the books on education written in olden days were mere treatises on psychology with asides on education, and they did not start from the problem of education trying to solve it with the help of the appropriate sciences This resulted in two watertight treatments of the subject—one dubbed "Theory" a disquisition on the training of the mind and the other labelled "Practice" full of excellent empirical precepts for teaching, which, however, had no relation to the "Theory". Further, many thought that a study of theory should by itself produce good teachers and therefore pointed to instances of many successful teachers who were ignorant of theory, and to many failures who were well posted in theory, as clinching their arguments for the futility of educational theory. They forgot that "sound practice is merely sound theory unconscious of itself; sound theory merely sound practice conscious of itself". Finally there was much premature theorising which did not take account of all the facts and so stood to be easily rebutted. People believed therefore that an ounce of practice was worth a ton of theory. "He held that theory was an asset but that without practice it was worse than a liability" (Kyne: *The Enchanted Hill* p. 186).

The Aim of Education

Strayer: Brief Course in the Teaching Process Chap I.
Thorndike: Principles of Teaching Chap I.
Bagley: Educative Process Chap 3.
Burnett: Essentials of Teaching Chap 2.
Ruediger. Principles of Education, Raymont Op Cit. Chap I.
Hanus: Educational aims and values.

Definitions come notoriously at the end of a study. If after this course we are able to define education, we shall have performed our task to some purpose. But at the very outset we should precipitate our conceptions of education in a palpable form so that it might form the ground to take off from. For this purpose a highly technical and finished definition is not necessary. Strayer s which defines education as "worth just the difference it makes in the activities of the individual who has been educated' might be serviceable though thus expressed it is only a truism and may mean only that education is merely the difference between the educated and the uneducated man. Neverthless it is so far good that it emphasises the changes effected by education in a person. Our subject of study is only this change and its laws. What changes shall we make and why? How shall we make these changes?

The questions what changes shall we make and why are largely beyond the teacher's province. They are the problems of the aims of education and their correct determination. These are generally laid down for the teacher by the authorities and he is only concerned therefore with the "how" of the educative process. Besides it is not necessary for his work that he should be familiar with them. The laws of education work in the same uniform manner whether the aim is to create a thief or a theologian. Dynamite explodes in the same manner whether used to blast rock or when used by an anarchist to blow up a public building. Fagin in his academy used the same methods for the perfection of thieves that the most reverend headmaster uses for the creation of paragons of virtue. Still there are reasons why the teacher should have a nodding acquaintance with the aims of education. The teacher is an intelligent being and not a mere automaton entrusted with the mere task of carrying out things laid down for him by others. He is not like the mason who is to carry out the plan of the architect without in any way having been consulted in the

decision of the plan or the criticism of it. He is on the other hand like a builder who has been asked to build the best house for Rs. 10,000. He has a certain choice of methods and what methods he shall use is often determined by the aim of education. Thus one who is shortsighted enough to think that science is being taught merely to make the pupil pass an examination might use cram methods. But one who looks upon science teaching as devised to help the boy realise his environment, would use such methods as would rouse his curiosity and interest in his physical surroundings. The aims of education should be known before school education is understood in the proper light The aims of the school should be understood if the year's education should co-operate intelligently with the school aim and the whole year's education should be envisaged before the day's teaching is illuminated. Above all aims determine educational values. What subjects we teach is largely dependent upon what aims we seek to achieve through them. Hence the teacher should be familiar with the subject of aims and values in education wh'ch goes by the name of Principles of Education.

The number of aims formulated for education is legion We shall not consider all of them but only a few. The aim which owing to the prevalence of unemployment among us at the present day, has achieved a certain amount of importance is known as.

The Vocational Aim.

Some think that education should have a utilitarian aim. That is, it should help us to earn our livelihood. This is contemptuously called "The Bread-and-Butter' aim. Seventy-five per cent of parents send their children to school only with this aim. There is something very definite about it and the results are quite tangible and realisable. Though purely utilitarian it is neither sordid nor antisocial in its results. The wish to give a better start in life to children is natural to parents and where it leads to much self sacrifice, it is distinctly noble. To advance individuals is also to advance the social group indirectly.

Nevertheless a purely vocational education does not meet the needs of life which consists of many more aspects than the mere earning of one's livelihood. Life is more than meat. One should realise one's place in the social system and be conscious of one's obligations to one's fellow beings. Therefore one should be fitted for the understanding and enjoy-

ment of life. To be able to use one's leisure profitably is perhaps as important even for earning a livelihood as the knowledge which directly enables us to do so. If the British working classes had been better educated in the enjoyment of leisure they would not spend it all in the public house and their earning power would have been correspondingly greater. Besides man has a soul which has to be fed. These considerations necessitate a liberal education, freed from the obligation of fitting for a particular calling. Hence subjects which do not directly contribute to training for a vocation have to be included in the course. History and literature which reveal the past and science and the constitution and progress of society, that reveal the present are therefore necessary. This is why Rousseau said, "Life is the trade which I shall teach my Emile."

A purely vocational training in narrowing one's outlook defeats its own ends. The changing industrial environment of the present does not require specialised ability so much as general ability or the power of adaptability to changing conditions. But a person who is trained in a single vocation and in nothing else soon becomes conservative and unprogressive. Hence the evils of a purely vocational training is not in its objective results but in its subjective effects. Again it is very difficult to foresee in a democratic society, by what trade a child would earn his living when he grew up. There are moreover some trades such as that of a day-labourer which can be performed by any one with little or no training at all. Where such a man has to have any schooling it should be designed to widen his outlook independently of helping him to earn his livelihood.

All this only against pure vocationalism. No one will deny that so important a part of one's life as earning one's livelihood should be included in a scheme of preparation for life. The absence of vocational aspects in present day education is largely due to its being a heritage from the times when education was only for the rich who had no livelihood to earn. The natural concomitant of the spread of education to the poorer classes is vocational training; for they cannot afford to spend seven or eight years learning things which do not help them to earn their livelihood. Therefore the problem of the hour is how partly to vocationalise a purely liberal education. No doubt the present system prepares for the liberal professions; but these are already overcrowded and the cry is therefore for commercial and industrial education.

The task of grafting a commercial education to the present system (Read Adams: Mod. Develop. in Edl. Prac. Chap. 2) is easy enough. Most of the school subjects could be taught with a commercial end in view. Thus composition may be so handled as to lead to commercial correspondence, arithmetic to accountancy and geography to commercial geography. In certain schools, boys in the High School are allowed to elect shorthand and type-writing. The history, scope and meaning of commerce might also be taught directly The education thus begun must be finished in commercial colleges.

It is more difficult to provide for industrial education. The only approach is through Manual Training which might reveal to us the mechanical aptitudes of our pupils. It may also break down the prejudice against the handicrafts and give dignity to labour. Along with this the general principles of mechanics might be taught with the history of inventions and the biography of great inventors. Thus a tendencial bias may be given towards vocationalism More than this is achieved in American schools by what is known as vocational guidance. By means of psychological examination, the capacities and aptitudes of the individual pupil are determined. Then the pupil is counselled to choose among certain elective subjects in the fields of business, the professions, the trades and technology, with a view to find out his real bent. This is then developed by proper training.

The Knowledge Aim.

This is the exact antithesis of the vocational aim. The one is much too practical, the other far too impractical; the one glorifies material possessions, the other intellectual possessions. The one represents a life of struggle, the other a life of leisure. This contrast comes of taking too abstract a view of knowledge. The advocates of this aim say that "The knowledge of that which is bfore us, or about us, which appeals to our experience, passions and pursuits, to the bosoms of business men is not learning. Learning is the knowledge of that which none but the learned know." This is to divorce knowledge from ordinary experience. Hence this view is called contemptuously "the cult of the head," "knowledge worship" and "the lust of the head'. It is also called the schoolmaster's fallacy as he plays a great part in perpetuating it. He is himself a product of the knowledge ideal in education: he has great respect for out-of-the-way learning and he aims at turning out

prodigies of learning from the school. From being engaged day in day out imparting knowledge to his pupils, he lost sight of its practical value and valued it for its own sake. Examinations accentuated the mistake in so far as they could examine little else than knowledge, while the prizes offered to men who did well in examinations tended to keep up the prestige of learning of this kind.

All knowledge must originally have served some useful purpose. As L. P Jacks has it (*The Education of the whole man*) each piece of knowledge is a disguised imperative, ordering us to live in *this* way and avoid living in *that*. But for that reason we cannot be called upon to make the whole realm of knowledge ours. We should pick and choose, select and reject according to some standard. Knowledge should lead to power and so knowledge which has become antiquated and does not function at present may be safely eschewed.

The Culture Aim.

The culture aim may be looked upon as a branch of the knowledge aim. In the knowledge aim, knowledge is sought for its own sake. In the culture aim, it is sought for its conventional value. A certain standard of knowledge is believed to be appropriate in the case of people occupying a particular station in society. Thus in the time of Locke, a knowledge of Latin and Greek was expected of every gentleman. In the same way certain habits of thought, tricks of speech, special kinds of deportment, were held to mark off certain classes of people from the rest and to give them prestige in the eyes of their fellowmen. Education under these circumstances aimed at giving such exclusive knowledge and peculiar characteristics. The culture aim therefore desires to produce rather the man of a certain type of mind and breeding, than to charge him with knowledge. By the persistent pressure of a particular type of environment it seeks to give e. g., a young man the Oxford touch and to a young lady the Girton manner. This is what Jowett meant, when he said "Oxford could teach English gentlemen how to be English gentlemen."

But there is a larger definition of culture which says that it is acquaintance with the best that has been thought and said in the world. Such culture adds beauty and refinement to life and would therefore form a coping stone to a good education. The vigorous utilitarian standard may, in this fashion, be toned down by the needs of culture.

The Complete Living Aim.

This aim was formulated by Spencer and because of his brilliant exposition attained to a great vogue. He said that complete living meant, that we should know how to order the right ruling of conduct, in all the possible situations of life. This meant that our education should prepare us for life not merely in the material sense but in the widest sense. We should know how to treat the body, in what way to treat the mind, to manage our affairs, to bring up a family to behave as citizens and to enjoy life. These various needs of life have corresponding activities. They are:—activities which minister to self-preservation; those which secure the necessaries of life; those connected with the rearing and disciplining of offspring; those involved in the maintenance of proper social and political relations and those which make up the leisure part of life. Our education should initiate us into these.

This is complete living indeed, and it includes most of the aims formulated for education. But how are we to know without reference to an outside standard when our life is complete? No such standard exists. Neither does the aim give a clue to the curriculum. It does not distinguish between the subjective and objective aspects of the educative process, and as such leads to sterility in thought.

The Moral Aim.

It is also called the aim of good character and was started by Herbart Our education should improve our character, otherwise Fagin's academy would itself be an educative agency. But there is a narrower sense in which education becomes convertible with morality. Aristotle finds in man two tendencies, one passionate and brutal, the other intellectual and human. Education, Herbart said, consists in the conquest of the lower impulses by the higher intelligence. Man is not born moral. The immoral tendencies in him are kept down by the will responsive to higher ideas. It was the function of education to supply these higher ideas and thereby to make the "good will" which he defined as "the steady resolution of a man to consider himself as an individual under the law which is universally binding." Thus we attain to morality by the long and complex training called education and so he said "Education may by summed up in the concept morality."

No one would deny that morality should be one of the aims of education; but as the sole aim it sounds rather narrow.

In ordinary usage the word is restricted to the relation between the sexes and even in an extended sense it is taken as not going beyond the decalogue. Are we then to spend all our time in the school trying to inculcate truth, honesty, obedience, &c? How can Science, Mathematics and other studies be brought into the curriculum? As a matter of fact the Herbartians do not stress these studies. Hence some have said that "moral" is interchangeable with "social," having in view the intimate relation between society and morals.

The Social Aim.

Morality is closely connected with society. The brute impulses which are inborn in man, and which are to be educated away, are individual and unsocial. Thus the robber who steals is individual and anti-social. Again morality arises out of social relations. Thus Robinson Crusoe cannot be said to be immoral but only unmoral. The question of morality did not arise in his solitude, where he can lie to no one and cheat nobody. The social virtues even, gain point only when they have reference to society. Thus self-denial and self-sacrifice are virtues because we deny ourselves and sacrifice ourselves to others. When they cease to have such reference they become vices. Thus what is temperance becomes asceticism, courage develops into foolhardiness enthusiasm degenerates into fanaticism. Therefore the essence of a moral act is its social reference and moral development is itself social development. This is why the Social Aim of Education is said to include the moral aim as well (Horne: *Philosophy of Education*).

The social aim in education has more claims to be accepted as *the* aim in education, than any other aim. It desires to produce the socially efficient individual whose marks are said to be (1) He must be capable of pulling his own weight. He must not be a drag on society and so should earn his own living. (2) In order that he may have a proper understanding and appreciation of the world in which he lives he must attain to a certain standard of intelligence and knowledge. (3) In order to fulfil his obligations to his fellowmen he must conform to a certain standard of conduct known as the moral standard. He should have the negative virtue of not interfering with the efforts of others and the positive virtue of contributing to the forces that make for human welfare.

This aim errs in so far as it subordinates the individual to society to a degree not observable in ordinary life. History

teaches us of the emancipation of the individual from the family, the clan, and the tribe, and not his progressive subordination to them. Man is a social animal and the social aim emphasises a very important aspect of individual life. But the social aspect, is not the only aspect of individual life. Man comes into contact with animate and inanimate nature also, for the proper understanding of which both, a knowledge of science is essential.

The Harmonious Development Aim.

This aim asks us to develop all the powers and faculties of man physical, intellectual, moral and aesthetic. The aim is so far suggestive that it warns us against a one sided development, such as will produce the man of reflection in whom "the native hue of resolution is sicklied o'er with the pale cast of thought" as in Hamlet, or the rash man of action, who acts first and thinks afterwards, as Judge Jepthah; or the kind of man who has developed the physical side to the neglect of all others and is called the splendid animal or the eccentrics of the freak art schools. In none of these cases, has there been a balanced development and the resulting life has been lopsided.

But the real meaning of the word "harmonious" is not plain. We are bound to ask "harmonious with what?" If with an outside standard no such measure is mentioned, how are we then to know when the "harmony" is disturbed. If "harmonious" within themselves, does it mean *equal* development of all the faculties or *maximal* development? If the former, we shall have the jack-of all-trades and master-of-none-type, who is everything by turns and nothing long, and only an amateur in his profession. If the latter, it becomes an impossible aim. For the man who is equally great as a poet and musician, as a painter and sculptor, as a philosopher and scientist, is known only to the pages of fiction.

Moreover that a faculty is there, is no reason why we should develop it. On the other hand, in the bodily economy many powers which were once functioning, have now become defunct through disuse The presence of vestigial organs bears witness to this. Those who give undue importance to sense-training and to the development of observation, should bear this in mind In the course of racial development the senses have come to lose much of their importance, the functions they performed having been taken over by other faculties such as the intelligence. Thus our powers of inference have taken the place of the senses in many cases. Without seeing it, we can tell a type-writer from its clicking.

Therefore to call into development such atrophied senses is to go against nature. Finally the aim does not give us a clue to the curriculum, and does not supply a ruling principle by applying which harmonious development could be ensured.

The Theory of Formal Discipline.

Those who believed in this theory held that the aim of education was to discipline the mind. It rests on the assumption, that a mental power might be exercised and perfected in a narrow range of activities, and may then be applied in any department of human activity. Thus reasoning power might be developed in Geometry and then be used generally in law or business. This generalisation or transfer of power was the key-note of the doctrine. It believed that the classics gave this discipline for the mind and so fixed them as the curricula of the school.

The truth of the theory was not questioned until people wanted to dislodge the classics from their place in the curriculum. Then they scrutinised the theory, on which their position was based and found out its hollowness. It arose in false analogies. The mind was compared to the muscle which developed by exercise. This is not true even of the muscle. Muscular power that has been developed for example by wielding a sledge hammer, does not function with equal efficiency in wrestling. Again the mind was compared to a tool which when sharpened can be put to any use. But in the case of tools, they make a mechanical adjustment. In the one case there is a dualism, but in the case of the mind a unity, for the mind is fed by the problem it solves and turns with relish to similar problems. "It is an error to believe that, in perceiving or thinking, the mind supplies the activity, whereas the objects exist on their own account...the truth is that all objects which are perceived or thought of become, by virtue of this very fact what is called 'immanent' in the mind; to this extent, they themselves become constituents of the mental activity (Spearman: *'The Abilities of Man.'* p. 39.)

The theory took its origin in false Psychology—the Faculty Psychology,—which believed the mind to be made up of a number of faculties such as memory, imagination, and that these could be disciplined by appropriate studies. We now decline to believe in the Faculty Psychology. A faculty is not a power but a function and a mode of reaction, which cannot work in a vacuum but requires knowledge content and an apperceptive basis. The false use to which it has been put, i. e. to bolster up the classical curriculum

also makes the doctrine false. Three other fallacies, were responsible for the belief in the doctrine. Those who chose classics did well later on in the university and it was argued that it was due to the disciplinary value of the classics. On the other hand it was because, owing to the prestige associated with the classics only the ablest students selected them. Again the improvement in a boy's mind discovered after a school course in the classics, was attributed solely to the study and not to inner growth and maturing. Moreover educationists who were men of intellect and as such capable of extracting general values out of particular studies thought the same capacity should exist in all.

Both deductive and inductive arguments have been used against the theory. The deductive arguments appeal to our common sense. If the theory were true, people who are clever in one direction must be clever in all. Yet who does not know of people who are very clever in one thing and dolts in most else? Thus Zerah Colburn was a genius in Mathematics but a fool in other things; and Laplace the great Mathematician was dismissed by Napoleon as inefficient in the Ministry. Again it does not stand to reason that the mind can be trained irrespective of subject content (Read Adams: *Herbartian Psychology Chap. V.*) Otherwise Fagin's Academy of Crime would be educative and we could have chosen pleasanter subjects, than Latin and Greek. The argument for transfer of training involves a psychological absurdity. The Formalists say e. g. neatness, in Arithmetic will later show itself in neatness of dress. This would mean that a habit could be generalised. A habit is a specific response to a specific stimulus. If it can be a response to a number of different stimuli, it ceases to be a habit and becomes a judgement.

Experiments have been carried out to discover if there is any spread of practice effect. After practising judging weights shapes and lengths of one type, another type was introduced and the new judgments were not more right, than if there had been no such practice at all. The conclusion arrived at, is that improvement in one single mental function does not bring about improvement in similar or related functions, that the slightest variation in data, diminishes the efficiency of the function until at last, passing through mediate steps of variable data to quite varied ones. there is a complete loss of efficiency which goes to show that there is no spread of practice effect. But in many cases it is true that excelling in one department makes it easier to excel in another. Hence certain channels of transfer have been recognised. The first is identity of substance. Where the

subject content is to a certain degree identical, study of one subject helps study of the other. Thus knowledge of Mathematics makes study of Physics easy. This is because the contents of both subjects are similar and not because there is a general faculty which had been disciplined by the study of Mathematics. The second channel is identity of method. Thus the study of Chemistry helps in Physics and Psychology, largely through acquaintance with laboratory technique. The third channel of transfer is identity of aim or ideals. Certain habits such as industry, perseverance, self-reliance and obedience appear to be generalised. Thus a person who is industrious as a schoolmaster for example becomes so as a farm hand. This is not due to the fact that the habit of industry has been generalised so as to function in different situations. But the teacher has developed a certain work attitude as a result of conscious striving after an ideal and this makes him industrious wherever he is placed. Again people who are neat in dress, in work and in life are not so because of a generalised habit of neatness but because they have an aim such as social prestige or success in work, in being neat. If it were a generalised habit we cannot explain the case of those who are very neat in their work, e. g., but slovenly in dress (Read Bagley: *Educative Process* Chap. 18). Therefore the theory of Formal Discipline is generally held to be inadmissible in educational theory.

The Problem Of Education

Horne: Op. cit. Chap 3. Ruediger: Op cit Chap 5.
Graves: History of Education in Mod. Times.
Beatty: History of Education: Morley's Rousseau.
Dewey: The School and the Child. pp 1...57.
,, *The School and Society Lect II.*

Horne says that the pupil, the teacher, the curriculum and the educational environment are the four presuppositions of education and that they cannot be reduced in number. But usually the three latter, are lumped together, and the problem of education is believed to be the interrelation of the two main divisions so obtained. The Romans thought the person, the indirect, but the thing the direct object of instruction—a mistake too common in immature teachers. We now think that the child is the centre of the educative process. [Dewey : *The School and Society* pp. 50 ff.] How the change came about is a matter of educational history. Modern education may be said to begin with the Renaissance when the classics were newly discovered and were studied

for their content. But soon a tradition in criticism was evolved and the pupil was taken through this and the grammar in the hope of giving his mind a discipline and thus the education degenerated into formalism Albeit, this empty soulless knowledge was looked upon as the mark of a gentleman. In thus associating itself with the aristocracy, the old education wrote down its own doom The 18th century saw the end of a social system. The Church which was one of its props, was undermined by the twin movements of Rationalism and Scepticism. Power in the state had fallen into the hands of the aristocracy who abused it and by their pride, cruelty, selfishness and oppression, alienated the sympathy of the populace. The people were ground down by heavy taxation and lived in utter misery. They traced all their unhappiness to the government and began to look with yearning to and to gloat upon, the times when there was no man-made law or government. Such a time they called the State of Nature. The great protagonist of this negative attitude towards politics and society was Rousseau. He preached a crusade against society and government and sounded the trumpet call to return to the State of Nature His doctrines resulted in the French Revolution which put an end to the old system. It was from the hands of this arch destroyer, that the educational classic known as *The Emile* emerged, and so reflects his hatred against society and man-made institutions in matters educational also. He set out to destroy the educational ideals of the *Ancien Regime*, which aimed at preparing the young to live and move, as members of the aristocracy. Boys and girls were dressed up as miniatures of fashionable men and women. The little boy had his hair powdered and wore a sword. The education consisted largely of conventional values. Deportment and dancing were taught along with the Latin grammar and some memoriter work. Rousseau set his face strongly against all this He said that the real purpose of the education was not to suit the child to an artificial civilization; but to keep his natural self away from the corrupting influence of society. "Everything is good as it comes from the hands of the author of nature; but everything degenerates in the hands of man." The child as a product of nature was not to be corrupted by being assimilated to man-made society. The child is the chief factor in education and not the culture to which he is to be correlated. This is why Rousseau is said to be the Copernicus of education: he changed the centre from the curriculum to the child. "Study the child for it is certain you do not understand him". "Follow the child; follow nature." This naturalistic educa-

tion was therefore also psychological in character. Rousseau emphasised education through the senses and discouraged book learning. He stood for practical methods of teaching and encouraged utilitarian and scientific studies.

Rousseau's educational speculations were made to fructify within the classroom by the great schoolmaster Pestolozzi. He accepted the naturalism of Rousseau and said "All the beneficent powers of man are due to neither art nor chance but to nature" and that "Education should follow the course laid down by nature." Hence he formulated the unfoldment of the child's powers as the chief aim of education. He compared the child to the seed in which the future tree was latent. Everything was within the child and only wanted drawing out. This made knowledge or what we put into the mind seem of little importance. He insisted therefore that the method of teaching should be, not through books but through the senses. Thus he created the Observation method. "Things before words" was his motto. Even language gained significance only by being connected with observation. Pestolozzi thus created method. As an educationist Pestolozzi had two aspects. In one aspect he held that education consisted in the derivation of ideas from experience with the outside world. This emphasised the place of sense impressions in knowledge and suggested that the contents of the mind had to be built up by the teacher. In this he was followed by Herbart. In another aspect he held with Rousseau that the fully developed man was implicit in the child itself and therefore that education was a natural development from within. In this he was followed by Froebel. Each of the disciples held fast to his own view to the total exclusion of the other's.

Pestolozzi was no psychologist and though he felt the need for psychologising instruction he did not know how to analyse the process by which the material gained by observation was assimilated by the mind. Herbart on the other hand was a profound psychologist and worked out the whole mechanism of the mind and the way in which it assimilated outside experience, formulating in the course, the doctrine of apperception. Since he looked upon education as consisting in the derivation of ideas from the outside world and in the contents of the mind being built up by the teacher he glorified instruction. He perfected the Five Steps as the method of instruction which latter, he held, built up the circle of thought and which in turn determined action. His aim in education was the "good-will" which he thought would result from many-sided interest.

Froebel, the sole and exclusive heir to the Pestolozzian theory of unfoldment and natural development was a mystic by nature He believed that man and nature were a unity, unfolding the will of God. Hence the natural unfolding of a child's powers was a divine process which cannot go wrong. Consequently, education whether in instruction or training, should necessarily be passive, following; not prescriptive categorical, interfering. The children's school was a kindergarten i. e., a garden in which the children were the unfolding plants and the teacher is, as Adams, puts it, an under gardener, who does nothing more than provide the conditions suitable for growth. The sole purpose of instruction is therefore to give scope for the self-activity, self-expression and free development of the child. This Froebel proposed to achieve by song, movement and construction. He had no respect for book learning and had not himself read any book for thirty years, and he did not use books in teaching. His influence is seen in present day education in the scope given for motor expression, in play, in clay-modelling, in Sloyd and Manual Training.

Thus education has always had two aspects, subjective and objective, psychological and sociological, formal and contentful, instructional and disciplinary. The last two aims above described, deal with the formal disciplinary aspect, the others the contentful sociological aspect. Some have held that it is development from within, while others, that it is building from without. As usual in such matters, the truth lies between the two extremes. The position is analogous to the problems of ship-building. Some say that a ship should be devised to suit the cargo it is meant to carry. Others, that, provided the ship is built solidly and equipped with efficient driving power, it may be used for carrying any cargo whatever. The wise builder will keep both considerations in mind. So in education both content and training should count.

The Biological Bases of Education

Ruediger: Op. Cit Chap. 2.
Horne. Philosophy of Education, Chap. 2.
O'Shea: Education as Adjustment.
Bagley. Educative Process Chap. I.
Adamson: The Individual and the Environment.
Woodburne: Human Nature and Education, Chap. I.
Shaw: Back to Methusaleh, Preface.

Man has too often been looked upon as standing apart from the brute creation. The doctrine of Evolution has,

however, taught us, that though he may be considered the highest product of creation, he has nevertheless affinities with the lower orders. If he is something more than brutal, he is also something less than human. He has no more senses than they; neither are they more acute. He has no instinct or impulse which is not present, at least in embryo, in the animal. His superiority is therefore mental rather than physical.

As we ascend up the ladder of creation, we discover that in the lower rungs life is largely ordered by instincts and reflexes rather than by intelligence. In man and the monkeys instincts and reflexes, play a lesser part than they do in dogs, lesser in dogs than in rabbits, lesser in rabbits than in hawks, lesser in hawks than in pigeons, lesser in pigeons than in frogs, lesser in frogs than in fishes and the intelligence plays a correspondingly greater and greater part. Now an instinct or a reflex does not lend itself to being educated. It is born with the organism and goes to the grave with it, without changing to any very great degree its mode of functioning. Naturally the organism whose conduct is predominently ruled by instincts, is therefore incapable of education. We can illustrate this by the example of the moth and the lamp. When light impressions impinge on the nervous system of the moth, it receives an overmastering impulse to fly towards it. When the wings are scorched, other impulses are set in motion and the moth retreats. If again the light impressions impinge in the same manner, the moth will be carried to the light again, showing thereby that it had learnt nothing by its previous bitter experience. A child would behave in a very different manner, as is seen in the saying "The burnt child dreads the fire". That is, the child has profited by its previous experience and learnt to modify its adjustment to its environment in accordance therewith.

Not only do the instincts diminish in importance as we ascend up the scale of life; but we notice a marked growth in the size of the brain and particularly, of the cerebrum, so that it is true to say that recent forms have a larger cerebrum than older forms and when we come to man, we find that he has the largest brain absolutely, except the whale and the elephant. The growth of the cerebrum and the diminishing importance of the instincts and reflexes are of great significance to education, as they show that in the case of man, life has been transferred from the instinctive to the rational basis and so becomes amenable to education. The cerebrum is the seat of the intelligence and of free ideas, aware of the aims and conditions of life. It is the physical substratum of

man's powers of deliberation and choice, of inhibition of instincts and of profiting by past experience. It also forms a reservoir of experience and knowledge on which he can draw at any moment, to meet any of the situations of life. From this point of view, the child's reaction to the fire may be described as follows. When a second time it sees the fire there is still the same longing to touch it; but it is reminded of its burn and the impulse inhibited. That is, the child's first experience has been stored in the mind: and has been used to choose the better of two possible types of behaviour towards the environment. In short, it had been educated. The essence of the educative process is only this viz, the acquirement of experiences which will later function in modifying action and it is possible because of the nervous constitution of man, which makes him an eminently educable being.

But in the case of man what is of the greatest significance is not merely his capacity for education, but the necessity for it. In the lower orders progress is achieved by the emergence of some special organic adaptation to the environment which is transmitted through physical heredity. Man, on the contrary, has had few anatomical variations the only one being the growth in the size of the brain, even which has not been noticeable during historical times. His progress depends on another factor which may be termed "social heredity" or "race experience" or "civilization" consisting of the accumulated wisdom of the ages, evolved in the course of mankind's adjustment to its environment. The necessary concomitant of "social heredity" is education, since it has now been more or less admitted as a scientific truth, that acquired characteristics cannot be transmitted by means of physical heredity. For example, if the father was an explorer, the child could not be expected to have a natural taste in Geography. The only way, acquirements can be transmitted to the younger generation is by teaching, and it is mankind's prerogative to teach its offspring.

Such education is also necessitated by the prolonged period of infancy in the case of man. In the fissiparous organisms procreation is by partition and not by partruition; and so there is no period of infancy. In the oviparous organisms there is a short period of infancy. In the viviparous organisms there is a lengthening period of infancy, lengthening that is, as we ascend the scale of life. The chicken and the calf have a brief period of infancy; while it is longer in the case of the monkey and still longer in the

ourang-outang. At the age of a month the young ourang-outang is just learning to walk, while the monkey has already found his feet. In the case of man, the baby couldn't walk the first year, learns to speak in two years, is still an infant at seven according to Medical Jurisprudence, legal majority comes at 21 and college is over at 25. This prolonged period of infancy is meant to prepare the child, for the complicated life of the human being. Without such preparation the child is very much like a savage or a beast, as was proved in the case of the savage of Aveyron.

The biological viewpoint in education has imposed the Adjustment aim on educational theory. In the struggle for the survival of the fittest, that organism tends to survive, which is able to adapt itself to its environment. Our education, if it should make us more efficient in life, should adapt us to the environment. Adjustment is the key-note of life. Protective colouration is a good example. The zebra, leopard and tiger are coloured to resemble their environment. Many insects and bugs are not to be distinguished easily from the trees or plants in which they live. The camel develops feet and pouch to suit the desert. In all these cases adjustment is on the physical plane; but in the case of man adjustment is on the mental plane. To get food from trees, the giraffe develops a long neck, the elephant a trunk, the ape ability to climb; but man uses a ladder and an axe. In his case, mind is an organ of superior adjustment to environment. Again while the adjustment of animals is to an environment as it is provided by nature, man has recreated his environment. He does not adapt himself to nature but adapts nature to his needs. The food and shelter that he has, is no longer as nature provides it. He makes warm places cool enough for him, and cold places warm enough. Space and distance have been as good as annihilated. Man has thus won mastery over his environment, and lives in one which is almost wholly man-made. Moreover, life on the physical basis does not exhaust all his activities. He eats to live and not lives to eat. Merely physical wants are but a portion of his life. He seeks intellectual, aesthetic, social and religious activities for their own sake. No mere shelter but a comfortable home, no mere clothing but aesthetic attire. Science is liked for the knowledge it gives, literature and art for the pleasures they provide and not merely for their usefulness. Thus man's life is no longer physical but intellectual. Above all it is characterised by the Moral Life without which life cannot be lived in society for a moment. So when we speak of Adjustment being the aim of education, we mean adjustment to those elements of our environment which are of

concern in modern life, the largest portion of which—the characteristically human part—we have termed "social heredity."'

The Curriculum.

Findlay: *Principles of Class Teaching.*
Raymont: *Op. Cit pp. 89-236.*
Sleight: *Organisation and Curricula.*
Educational Values and methods.
Dewey: *School and Society.*
School and the Child.
Ruediger: *Op. Cit. Keatinge: Studies in Education.*
Horne: *Philosophy of Education, Chaps. 4 and 5.*
Bode: *Modern Educational Theories.*

We have said that the aim of education is adjustment to environment and indicated that the environment is "social heredity." The primitive savage began in ignorance and though he had the power of profiting by past experience, his limited powers of communication made such experience die with himself. Perhaps, he initiated his offspring into some of them, and the medicine man and priest became depositories of folk lore, custom and culture. But with the invention of an objective written record, it became possible to conserve the experience of the race; and man came to profit not merely by his own experience, but by the experience of others of his kind. This racial experience has been accumulating through the ages and constitutes the environment to which the child has to be adjusted by his education.

Education therefore,. consists, in the sharing by the individual in the race's life, of bringing his own life into line with the life of the species as it is. In this respect we may regard our children as "the heirs of all the ages in the foremost files of time.' The curriculum is the means within the school room, by which the individual is adjusted to racial heritage, and should therefore be co-extensive with race experience itself. This is why it has been said to be the epitome of man's life. It consists of the achievement of the race, the conquest of nature and the movement of affairs. Its materials spring from all times and places, and consist of those traditions and achievements of the race that have proved and are still proving, of value in increasing the efficiency and richness of both social and individual life.

This environment which has been created by individual minds, therefore represents the achievements of the mind of the race. The mind of the race is merely the individual

mind writ large and should exhibit the characteristics of the individual mind. The individual mind has three modes of being conscious. It knows, feels and wills. That is, it has an acquaintanceship with the external world, in which it takes a certain pleasure or displeasure, and on which it works certain energetic reactions. As a result of these three aspects of the mind, a large amount of race experience has grown which being the results of mind action is more spiritual than physical in nature. Consequently the elements of this spiritual environment are three in number, the intellectual or what is known; the emotional or what is felt; and the volitional or what is willed. The mind knows truth and avoids error; it feels, as its highest object, beauty and avoids ugliness; and it wills in momentous issues goodness and avoids evil. Truth, beauty and goodness are the race's spiritual ideals, to which education has to adjust the child.

When the mind exercises upon the external world, its powers of knowing, the resulting product is science. Science is a product of the effort of the mind to know the truth concerning reality. It is the attempt to interpret the world that surrounds us. The world from the point of view of knowledge, consists of two divisions—the knowing mind and the known matter. Matter falls into the two divisions of the organic and the inorganic. The attempt of the mind to know the truth about the organic matter, is embodied in such organic sciences as Biology, Physiology, Ethnology. Its attempt to know the truth about inorganic matter has resulted in sciences such as Physics, Chemistry, Astronomy. When the knowing mind has turned to study itself subjectively as process, the resulting knowledge is known as Psychology. When the mind has exercised itself on its own products objectively, we have such sciences as Logic, Aesthetics, Ethics. The body of the race experience created by the knowing aspect of the mind is known as the intellectual environment. When the mind has been busy exercising its feeling aspect on the world that surrounds it, the result has been great Art, which appeals to our emotions and to our sense of beauty. Architecture, Sculpture, Painting, Music, Literature and Religion, therefore constitute our emotional environment. The race has been busy interpreting the world, hence arose the intellectual environment. The race has been sensitively appreciative of and affected by the world, hence arose the emotional environment. The race has been energetic in moulding the circumstances into which it was naturally cast; hence arises the volitional environment. It consists of what man has achieved and the record of such achievements. It is the monument of the will of

man. There are three ways, in which the will of man may act viz., as an individual, as society, and as a nation. When the individual acts, we have morality, when society acts, we have law, when the nation acts, we have constitutions. The record of these actions, forms history.

Such is the spiritual environment to which the child has to be adjusted. To speak in popular language, the child should be posted up in the racial experience and brought into line with it by means of education. That is, his individual mind should reflect the mind of the race. How can this be done otherwise, than by reproducing in the individual mind, the mental history of the race. Mental reproduction is the cause of education. What the race has produced, the individual reproduces and becomes actually what he is potentially. So far as mental events go, we may assert with confidence, that the individual repeats the race, or in scientific language, ontogeny repeats phylogeny. The truth of this statement has brought into educational theory, a doctrine of some importance, known as the Culture Epoch Theory or the Recapitulation Theory. This theory says, that there is a parallelism between the development of the human race and of the individual, and that this parallelism is important for the selection and arrangement of materials for the course of study. As Herbert Spencer says, "The education of the child must accord, both in mode and arrangement, with the education of man considered historically."

This theory owes its origin to several contributory causes. There is first the philosophic historic cause. As a reaction against the rationalistic, individualistic and naturalistic philosophy of Rousseau, which reviled society and wanted to go back to Nature, a school of thinkers pointed out and emphasised, the contribution of the past to the present. The child was therefore to absorb his social environment and not to run away from it. There is secondly, the educational argument that in bringing the child to the level of the present civilization, no method could be better than making him go through the several stages by which civilization had itself progressed. Besides this would be proceeding from the simple to the complex. Then, there is the argument from embryology. The individual organism, during its development from the original germ to its perfect condition, is said to go through the various steps of evolution by which the lowest types of life have reached up to their summit in man. This repetition goes on post-natally also. For example the erect attitude comes late, and so does the power of speech. Only the apes attain to the erect state, and even they do not

reach the stage of speech. The little child is very much like a savage mentally in its fondness for colours, for toys and in his belief in supernatural agencies and in his fears of them. Several different schemes of cultural development have been given. First the group; then the individual and finally conscious subordination to the group. The emotional stage subdivided into the mythic, animistic and wonder sub-stages, the utilitarian characterised by the tendency to observe, gather and classify or the fact stage, and the reflective or the law stage. Still others, speak of the hunting and fishing stage, the nomadic stage, the agricultural stage, the age of metals and the age of commerce.

However different the system of classification suggested, the resulting curriculum is neverthless uniform. Myths and fairy tales for the early period, Robinson Crusoe, the story of the patriarchs in the Bible, as marking the transition from the tribal to the national; and modern history, and literature for the later years. Such systems have been worked out by the Herbartians at Jena and Dewey in his experimental school. The theory was so far useful that it suggested, that the curriculum should be fixed by other than conventional, formal or logical considerations. It recognises the necessity to consider the unfolding of the psychology of child nature and of giving importance to sociological considerations. It once and for all, threw ridicule on the view that the child was a miniature adult and brought into prominence the importance of history and literature. Some cautions have, however, to be kept in mind. The emphasis should be laid on contemporary culture. All the stages need not be studied. Otherwise Astrology should precede Astronomy and Alchemy, Chemistry. Again the pupil cannot have the time to go through every stage. So, no past period should be selected if it does not help us to understand the present. The starting point should be the present and the knowledge of the past should not remain isolated, but should be firmly welded to the present. Moreover history should not determine the needs of the child, but the needs of the child should decide what history he shall study. Again, this theory emphasises products at the expense of processes, thereby giving the notion that society is static. Even history and literature cannot be understood isolated from other activities. So practical activities of each stage should be included and there should be close correlation to life so that the child may advance from the family, school, city, province, to the community and the race. (*See Dewey*: "*School and Society*" pp 62—65).

A Wide Curriculum

(Sleight: *Organisation and Curricula*, Chap. 4).

If the curriculum is merely another word for race experience it should be very wide indeed. Other considerations too point in the same direction. We have said that the aim of education should determine the subjects of study, because it is through the latter that the aim is to be achieved. Thus there are some who say that character formation is the aim of education. They have fixed the humanities as the chief components of the curriculum. However, character itself is a many-sided affair, not any one of the several attributes—strong will, industry, perseverance, aesthetic taste, piety, &c.—can ever form the only attribute of the man of good character. When we consider that no trait such as industry obtained in one sphere of activities can be transferred to another, how much a pupil will miss of the agents of character formation if he leaves out either the languages or Mathematics ! When we take the social aim in education, the danger of a limited curriculum becomes apparent. States very often have a temptation to doctor people's minds in such a way as a to perpetuate their own authority. This is done through the curriculum and as a consequence individual traits are neglected and the individual unduly subordinated to state considerations. Therefore the curriculum should not merely promote social efficiency but also ensure personal sufficiency. We have seen that a purely vocational aim produces narrowness and defeats itself. Again adjustment to environment means that no fundamental portion of it shall be neglected. Hence the contention of the formalists that a narrow curriculum would suffice, goes against the direction pointed to by all other aims of education and being constructed on subjective considerations alone, can well be rejected. However, it is beyond the capacity or the time of the child to learn all. It is too much to expect detailed knowledge of everything, neither does detailed knowledge of something excuse ignorance of fundamentals. Hence the curriculum should contain at least a general minimum of fundamentals.

The Curriculum should be Flexible.

The curriculum often becomes standardised, the same diet being forced upon all irrespective of nature and environment. But different people want differing curricula ; and so do people of different surroundings. The rural school must be treated differently from the urban school, the slum school from the respectable school, and a school from a manufac-

turing district should be treated differently from a school in an agricultural district. If separate curricula are devised for these it will prevent the free movement of children; and there will be a lack of uniformity in general culture. Hence the curriculum should be standardised; and at the same time it should be flexible so as to provide the small variations needed for satisfying different conditions. These variations are largely supplied by teaching method. Thus electricity would be taught in urban schools by reference to tram cars in rural schools by reference to motor lorries. In the case of the slum school the lack of the social opportunities would be made up for by the introduction of handwork. Where changes in the curriculum have to be made, they should be in accordance with the principle of compensation. For example the town child would be taught about things in the country and *vice versa*.

The Curriculum should adjust the pupil to Progress.

We have said that the curriculum is the epitome of man's life but man's life is progressive and so the curriculum should leave room for progress. This should be true, both as regards the inclusion and exclusion of knowledge. It is very necessary to exclude knowledge that has become out of date and to include knowledge that is pertinent to present life. This is not so easy. Obsolete knowledge finds champions in men, who have specialised in it and who would lose the cunning of their hand, if it were excluded. New knowledge is chiefly advocated by faddists, whose extravagant demands alienate the laymen. Besides the old has claims on us because we reverence the training we ourselves have had; and many oppose the introduction of the new from sheer conservatism. Moreover the new subjects lack the school facilities needed for teaching them; and there are not enough teachers who will impart them. For these reasons, it is true to say, that the school always lags a generation behind the civilization of the time.

The curriculum should prepare the child for the enjoyment of leisure. Herbert Spencer said that Literature, Music, Art, &c., "as they occupy the leisure part of life, so should they occupy the leisure part of education". Because an activity holds a large or small place in life, it does not follow that it should hold a corresponding place in the school. Many men spend the greater part of their time in digging ditches, for that reason, digging ditches need not have a place in the curriculum. It can be learnt

&c., require hard and prolonged preparation and since the exigencies of life do not allow of learning them incidentally they should have a large place in the curriculum. The capacity to enjoy leisure determines a person's capacity to work. By the leisure pursuit of a nation is its true character known. The proper enjoyment of leisure has become a great desideratum of present day civilization. The improved means of production have enabled a larger amount to be produced in a smaller time, thereby augmenting the leisure of all classes. If this leisure is spent in drugs, alcohol, the cinema and in reading shilling-shockers the reaction would soon make itself felt in the work of the nation.

Criteria for the selection of Material for the Curriculum.

There are two conflicting criteria for the selection of subject matter—the claims of the environment and the claims of the child. When the former criterion is adopted the Law of Equipment settles the studies chosen. The school is asked to equip for Necessity and for Progress. Equipment for necessity brings into the curriculum such bread and butter studies as shorthand, book-keeping, shoe-making and typewriting. Necessity varies with the times. One age necessitates a knowledge of archery; another that of commercial arithmetic. Therefore the curriculum should be changing and should be adjusted to Progress. As a result a number of new studies make their entry. In the olden days a boy had to study Latin and Greek, now French and German too have to be mastered as equally, if not more, necessary. Some time ago Chemistry was said to be necessary and now book-keeping is said to be more important. Those who fix the Curriculum by reference to the claims of the environment look upon childhood as merely the antechamber of manhood having no individuality of its own. They neglect to take account of the knowledge, capacities, interests and needs of the child; and therefore the resulting curriculum lacks all organic connection with child life. This mistake is generally made by parents. Often however, the rigorous utilitarian standard is toned down by the spirit of conservatism which looks upon the child as the inheritor of *tradition*. The conservative principle designs to create the child after its own image and results in the desire of the adult to produce his name, his type, his race in those that follow. The child must do what his forefathers had done. A language is to be learned, a book to be studied, a building to be reproduced solely because our forefathers wasted time and talents on it. Therefore

the past is inculcated for its own sake. This is the basis of a Liberal Curriculum. The child should be familiar with great books, great art, great lives, and thereby receive inspiration, strength and consolation from them as his forefathers had done.

When the claims of the child determine the curriculum, children's interests, purposes and spontaneous capacities decide the subjects of study chosen. It is a matter of history that the Nineteenth Century is the children's century when the child came into his own. (See Averill: Psychology Chap: 46.) Until then, though it was agreed upon as a matter of method, that the school fare should be suited by the teachers to the childish palate, the selection of subject matter was largely looked upon as settled by the need of preparing the child for adult life. The 19th century which saw the inception of many philanthrophic movements gradually began to look upon the child as having an individuality of its own and not merely as a half way house to manhood. The movements started by Rousseau, Pestolozzi and Froebel fell on apt soil. The advance of the Natural Sciences brought their methods to be applied to the study of children and it was discovered that what was good for the adult to study, may not be equally good as a subject of study for the child. In short students of the child said that he was a growing organism and that the material for study should be chosen to suit the different stages of growth, But as yet the researches into the different periods of child life have not been completed and it may take another century before they begin to influence the curriculum. However, it is generally agreed that the fare should be suited to the digestive powers of the pupils. What these powers are, have not yet been settled by Psychology. Meanwhile the fare has been decided by interesting analogies such as the Culture.—Epoch Theory. The advice has also been given, that the child should grow in length and in breadth in accordance with the principle of Harmonious Development. This is known as the Law of Balance and it pleads that the child is a many-sided creature who can develop his character to perfection, only if all his powers have a fair chance of development.

The contention that the child should be regarded as a human being with his own nature, capacities, and his own ideals leads in the writings of Herbart to the doctrine of interest. By Interest we do not merely mean the art of being interesting in classes. Commonly the doctrine of Interest is taken as saying "schoolwork is naturally dull, and like the bitter pill being made palatable by sugar coating, should schoolwork be made tolerable to the pupils by means

of interest." But the reason for dulness itself is because the interests of the child have not been taken advantage of. The child has abundance of interest in fields of interest, which he is ready to explore and exploration gives him pleasure. Herbart classifies these realms of interest into two main divisions—those arising from intercourse with our kind and those conditioned by our experience with the world. The former is divided into social, sympathetic and religious and the latter into empirical, speculative and aesthetic. These groupings are not above reproach but they form good criteria for the selection of material.

The law of apperception should also be taken account of in deciding on the curriculum. Interest is a subjective condition common to all mankind. Apperception speaks of an objective condition varying with individuals. The advance of each mind to fresh fields of knowledge,, depends upon the knowledge that it already has and upon the nature of the new knowledge and its relation to the old. Therefore earlier portions of the Curriculum should prepare the way for the later and no new knowledge should be introduced in any stage of the Curriculum which has not been adequately prepared for earlier.

According to Froebel, Activity is the one striking feature in children's lives. They are not only receptive of knowledge, but incessantly active in expression. They not only exhibit interests, but also impulses. They acquire character not only by the absorption of ideas; but by the repetition of right acts leading partly to right habits and partly to new modes of expression and thought. The older idea was to restrain, coerce and conquer the child's impulses and to submit his will, to the will of his elders. As the Herbartian tries to lead the child through his natural interests to a worthy character, the Froebellian tries to find in his impulses the seeds of the highest forms of human energy. The child takes delight in acquisition and in imitation which later on leads to origination. The teacher's care should be, not only to provide suitable material for thought but for action. Hence in our curriculum we should admit the arts and occupations of the young. Drawing, Music, Games and Manual Training should find a place in the curriculum.

These conflicting criteria spell an opposition between the child and the curriculum. The child lives in a somewhat narrow world of personal contacts. His world is a world of persons, and sympathy and affection are its keynotes rather than conformity to truth. In the curriculum he is taken out into the large world of space and time.

Again the child's life is a total one. Things form and reform rapidly in relation to him: but the various studies divide and fractionise the world for him. Thirdly these subjects are classified. Facts are torn away from their natural setting and arranged in logical formation according to some abstract principle. From this natural conflict have grown the two schools which we have mentioned. One school emphasises the value of subject matter. The child's life is petty, narrow, his impulses egoistic and self centred his experiences confused, vague. Hence the best thing we can do, is to ignore and minimise the child's individual peculiarities, whims and experiences. Substitute for it stable and well ordered realities in the form of studies and lessons. This school stands for "Discipline" a logical stand-point, guidance and control, law and erudition in the teacher.

The other school focuses attention on the child. The child is the starting point, centre and end. His growth and development is the ideal. Studies are but subservient to his growth. Not knowledge but self-realisation is the goal. Again learning cannot be got into the child from without. The child can grow only by his activity. Hence this school stands for "Interest", the psychological standpoint, sympathy with the child and knowledge of his instincts, freedom and initiative and spontaneity. It prescribes a curriculum without due regard to preparation for adult life and so it is characterised by lack of system, corresponding with the transitory desires and purposes of children, incapable of developing into the pursuits and purposes of adult life.

We have already seen that this conflict will disappear if we sense the real problem in education. That consists of an immature, undeveloped being, the child; and certain social aims, meanings, values, incarnate in the matured experience of the adult and the interaction of the two. These two factors are not opposed. Subject matter is not outside the child's experience. It is present in its germ, in embryonic form which reaches its full growth in adult experience. The growing child is flowing and moving towards the same experience. Hence the two form but two limits in a single process whose centre is the child.

The seeing of the end in the beginning, the perfectly organised subject matter in the crude experience of the child is important educationally speaking. When we know the end to which the child's present experience is moving, we can easily guide and direct the present experience properly. The child's present experience is no end in itself; it is merely transitory and evanescent. If we take it as an end, we are apt to make grievous error. Thus we may develop a

waning tendency and thus arrest development. Or we may encourage a culminating power and interest and that may lead the child to high achievement. If the old education was apt to look upon childish things as fit material to be cast away, the "new education" is apt to hoard them up long after they had out-lived their use. The child's purposes and interests are not to be cultivated just as they stand. They are but leverages to other accomplishments. Subject matter is thus to be used to free the life process for its own adequate fulfilment. This cannot be done in vacuo. The child can develop nothing out of itself. Neither can anything be imposed from outside. The real method would be to find in the crude experience of the child the germs of the highly abstract and organised knowledge of the race and to provide the conditions for its being freed in all its full development. Thus the crude impulses of the child in counting, measuring and arranging things are embryonic of the highest mathematical scholarship.

One of the ways, in which to bridge the gulf between subject matter and the child, is to psychologise instruction. There are two ways of looking at subject matter, one logical when it is looked at from the point of view of the subject matter itself, another psychological when it is viewed in relation to the child. The psychological follows the actual growth of experience step by step. It is historic, while the logical deals with it as having reached a particular stage of fulfilment. The one is dynamic, the other static; the one deals with process, the other with product. The logical summarises and arranges the result and leaves little clue of the steps by which it was attained. The relation between the two, is like the relation between the notes made by an explorer and the finished map that had been made after the country had been fully explored. No one would get the experiences of the explorer by looking at the map. In the same way, logically formulated subject matter is no substitute for the individual experience. The map sums up past knowledge and gives the starting point to fresh advances. So does the science. In so far as it serves as a step for further advances it is psychological. So far as it is the organised result, it is logical in character. The function of the scientist is to discover new truths. That of the teacher is to present old truths so as to form part of a growing experience. To the scientist subject matter is self-contained; to the teacher it represents a given stage and phase of a growing experience. To see it in this light, is to psychologise instruction.

Ordinarily, however, subject matter is taught as dead deposits. The whole arrangement of the class room is made

for listening and not for working. Listening includes reading and both processes mark dependence of one mind upon another. There is a passive absorption, reception and acceptance. No active, growing experience. A certain amount of knowledge and skill are desirable. This is divided by the six, seven or eight years of school life and each year's work decided accordingly. The evils of trying to educate the child thus from without in, are manifold. First there is no organic relation between what the child has experienced and the new experience: lacking such relation, the key to the new mystery is lost and the new knowledge remains but dead lumber. Secondly the evil of external presentation is lack of motivation : you can take a horse to the water, you cannot make him drink. His drinking depends upon his thirst; so does a child receive subject matter, if there is disclosed a need for it. Where subject matter is psychologised and related to the experience of the child, an obstacle may be located to remove which the child may find out the information for himself. Thus Dr. Adams speaks of a dull boy who being interested in the making of balloons began to make huge strides in Chemistry (Adams. *Herbartian Psychology p. 265*). The third evil is that when matter is arranged logically, it looks deceptively smooth. The thought-provoking character is obscured and the organising function disappears. The child finds it hard to understand and takes to memorising instead. Fourthly, where real interest is lacking pseudo-interest enters. Routine brings in an interest and when the child is used to studying in this manner, he becomes fond of the methods as the prisoner loves his fetters. Or he gets up the matter for fear of punishment or in expectation of reward.

This is why it is said that the subjects of the curriculum should be taught as activities. The school must be thought of primarily not as a place where certain knowledge is absorbed but as one where the young are disciplined in certain forms of activity. The old conception that education consists in the passive reception of information is an anachronism. It may have been true of the days when learning was the possession of the few with whom it was deposited. Knowledge is no longer a solid : it has been liquefied and thrown into circulation. He who runs may read. There are said to be 66,000 applications of electricity to real life. Therefore, knowledge of electricity is not to be obtained significantly from books, but by coming across its applications to life. We saw that experience is the only teacher and that the school is an experience giving institution. These experiences are of two kinds, the personal and the imper-

sonal. Personal experience is first hand and arises by direct contact of the individual with the environment. Impersonal experiences are second hand, communicated or handed along from one person to another without the recipient having experienced it in his own person, What is contained in books, belongs to this class. No impersonal experience could be rightly acquired except on the basis of a personal experience and so the latter is the beginning of all instruction. It is the function of the school to make impersonal experiences personal through the life experience of the child (Jones: *Princ of Edu.* Chaps 1 & 2). Hence have arisen the various dynamic methods, Heuristic Methods, Project Method and the Play Way. These teach knowledge not as dead deposits but as living experience.

We have seen that education consists in the acquisition of experiences that will function in adjustment. Experience is a personal matter. Hence a fact or a piece of knowledge or other impersonal experience should become personal, part and parcel of ourselves, before it can lead to power in adjustment. Therefore, the nurture theory (Adams: *Evolution of Edl. Theory* p 166 ff.) in education which said education consisted in feeding the mind with facts, cannot be true. Knowledge for its own sake cannot be of great value. There are many facts about our environment which are valueless for us. Therefore the knowledge that counts, the knowledge that is power is not mere acquaintance with facts; but experience of facts in their relations with each other and with ourselves. In other words the aim of education is the knowledge not of facts, but of values. "Values are facts apprehended in their relation to one another and to ourselves". (*Camb. Essays on Education* p. 12).

Herbert Spencer considers it possible to turn fact into faculty. He says "knowledge is turned into faculty as soon as it is taken in, and forthwith aids in the general function of thinking. It does not lie merely written on the pages of an internal library as when rote-learnt." This is difficult to understand. How can a fact which belongs to the outside world, become part of the soul which is inside man? This is to take a crude view of the relation between the soul and the world. The soul is not something different from the world. It is not a faculty but a function mediating a relationship between the individual and the environment. It arises in our intercourse with the world, and is merely the power of reacting to outside stimulus. The character of the soul depends upon its re-action to former stimuli. The relation therefore of the soul and the world outside is one of intimate inter-action. Facts make the soul, so to speak. The child

e.g., first thinks that a dog is only a ball of fur, to play with. Supposing one day the dog bit the child in a moment of vexation, the child's re-action would immediately change. The child would look upon a dog as a biting animal. If later as a boy, he knows that a dog is set to watch a house, he will avoid trespassing into such a place. As a youth, if he finds the dog declining to take water, he will know that it is suffering from hydrophobia and will take steps to protect himself and others from the ravages of a mad dog. Thus his increasing knowledge of facts has given him increasing power to deal with his environment. This is how fact becomes faculty, and knowledge leads to power.

Correlation.

The subjects of the curriculum are not so disconnected as at first they appear to be. Therefore each study, should help the other study, Geography helps History; Science and Mathematics are mutually dependent and as Jacotot puts it "all is in all." Knowledge is related, is one, and this is specially true of primary instruction. The child's experience is a total, intergrated by his own personal consciousness. It is not divided up and gathered together again as subjects by means of the integrating force of certain abstract principles. It is the same boy who receives at 9 A.M. a grammar lesson, at 10 learns Arithmetic and at 11 begins on a history lesson. He will seek some mode of reconciling these differing classes in his consciousness. Those which could not be so reconciled would drop out. Four other causes are responsible for drawing attention to the principle of correlation. (1) A crowdep curricula has made it necessary to include under one and the same title many subjects which were formerly thought to be different. Thus oral and written Arithmetic, Reading and Recitation, Arithmetic and Mensuration, all had separate places on the time-table. This was because each subject was awarded a separate grant by the State. (2) The neglect of the relation between various studies led to artificial and to unpractical treatment which led to waste of effort and lack of interest. Thus Theoretical Geometry was treated as a separate subject from Practical Geometry; Algebra was not looked upon as Generalised Arithmetic; and Pure Mathematics was differentiated from applied Mathematics. This made the theoretical part dry and unrelated to life and doubled the work of the school. (3) The employment of specialist teachers helped the closed system. Thus the Drawing Master could, if he were only brought into relation with school work, help the work in Botany

and Physics. (4) The Herbartian Psychology taught that action depended on the circle of thought and the closer knit this was, the more strong would be the man's life; and the more confused, the more planless, his life.

Correlation is the inter-relation of material so that each lesson is made interesting and intelligible. It has three effects. (1) It enables the child to see the bearings and meanings of things. Such meanings are possible only when relationships are disclosed between what he knows, and what he is asked to study. Without it study appeals only to the mechanical memory. Thus correlation helps understanding and thereby helps memory, (2) It makes the lesson interesting by connecting the new with the old. (3) Correlation is based on the application of old knowledge to new, and this is a good habit within and without the school. In order to do this one should hunt for ideas within oneself and to do this is to think.

Three types of correlation are possible (1) Correlation within the content of a subject. This is the arrangement of each topic in such a manner as the one develops as a natural outcome of the other and prepares the way for the succeeding one. It is the problem of grading the subject matter. It may be in the logical or the psychological order. The logical order implies any systematic development of the subject from premises to a logical conclusion. The psychological order is that which appeals to the child's interest and powers of comprehension. In learning modern languages it is the logical order to begin with the letters; but it is not the psychological order, as letters have no meanings by themselves. The practice of starting conversation as in the Direct Method will be the psychological order of study. (2) The interrelation of subjects in the curriculum. These are of two kinds Incidental and Systematic. Incidental correlation would be the relationship that arises by the broad presentation of a subject and may be termed a wise discursiveness in teaching, the teacher co-ordinating his material with what the pupils know in other subjects. Thus the discovery of America may be treated from the point of view of history geography and literature, each illuminating the other. Systematic correlation arises when the subject is so arranged that the day's work not only arises out of the previous day's work in that subject and prepares for the next day's but when it is seen to be also the natural outcome of the work done in other subjects. Thus not merely should there be a vertical correlation, but there should be a horizontal correlation as well. Incidental correlation arises day to day and is a mark of good teaching; systematic correlation should

be planned beforehand so that it may not happen that when the History lesson is dealing with Wellington, Geography is at China, Reading is at Drake's voyages, Literature is at Goldsmith and Science at artesian wells. [Dodd: Introd to Herbartian Prin. of Teaching chaps VII and VIII] Correlation of either sort may either be forced and superficial, or natural. Thus the history of a war could not be properly understood except by reference to its geography and when so correlated, would form a natural correlation. But if the history of a war gives rise to calculations as to its costs &c., it is forced correlation. This may not fall in with the natural Arithmetical sequence or throw any light on the history, Thus it would be forced correlation, if in studying the egg, we bring to bear on it all the poems about the egg and commercial Geography. The true principle of correlation will be that the teacher should press into his service, every bit of allied material, which would help towards a completer grasp of the topic under consideration. Generally speaking, members of a definite group of studies should be associated. Thus speaking, reading, grammar and composition should be associated in the language group. Literature and History may be correlated. The Mathematical group should not be scattered through the time-table. Again theoretical pursuits should be correlated with the practical. Thus Drawing may be associated with History, Botany with Mathematics.

(3) Correlation of school and the world. What is studied in the school must be useful for life. *Non scholae sed vitae.* The school should carry on the wotk in close correlation to the pupil's life at home and abroad.

Concentration

is an extreme type of correlation. If we go on correlating each subject with every other subject, we get a compact or concentrated body of knowledge. That subject which lends itself easily for correlating with others or round which for certain reasons other subjects are correlated, is known as the "core subject." This principle is a logical deduction from the Herbartian aim in education which is the formation of a good character. The good character is dependent on the good will, the will upon desire, desire on interest and interest on the circle of thought. If that is compact and coherent the man's life would be well-directed; if it is composed of a loose aggregate of floating ideas, it would lead to an aimless life. Therefore the subject of instruction should be unified and since history, literature, story and

legend are rich in ethically, important content, they should form the core subjects round which the other subjects are grouped. Here, the difficulty, is about bringing in Mathematics and Science which is got over by recognising Geography as an associated study opening the way to the Natural Sciences and Mathematics. There is another scheme, that of Col. Parker making Geography the core subject, leading on one side to History and Literature and on the other to Science and Mathematics. The danger here, is that we may give undue importance to one subject. Naturally the principle is applicable in a large degree only to the primary classes because to the child the world outside is an undivided whole and knowledge appears to be undifferentiated. Hence we should choose some central theme out of which we should bring forth to the child's consciousness that the world is made up of several elements.

The doctrine of concentration rests upon the Herbartian psychology for its validity. That psychology assumes that vice is ignorance and that stupid men cannot be virtuous. This is to place too much stress on instruction and too little on natural aptitudes and innate tendencies. A man may be well educated with large unbroken masses of thought and yet do wrong owing to bad example and innate tendencies towards evil.

In admitting subjects to the curriculum some cautions have to be kept in mind. The first is known as the *Rule of Restraint.* The curriculum should never become crowded. New studies are always pushing their way in, as a result of progress. There can be no room for them unless they replace others which have become obsolete. Many schools show in their prospectuses that they teach all these subjects, so that they may recruit their scholars from a wider field. The reputation of up-to-dateness thus obtained, may be at the cost of efficient teaching. We cannot pour a quart into a pint pot The curriculum is already crowded and has begun to interfere with the efficient mastery of subjects. This is why in the Howard Plan each student is asked to elect only a lesser number of subjects at any time, than those which he or she is expected to offer for the Matriculation.

The second caution is known as the *rule of sufficiency* and forms the counterpart of the first. When once a pupil is committed to a study, reason demands that there should be no stinting of the amount of time needed for it. That we should not introduce too many studies, is because each should have an adequate amount of time devoted to it. One lesson a week in any subject is bound to spell failure

especially if it is taught without relation to other subjects. The mind is simply incapable of gaining hold upon a new set of ideas and habits unless it is allowed to attend closely to them with renewed attention day by day during some months or years. This is especially true of a subject newly started. In the beginning there should be an intensive study of it. When English is started in the Preparatory class if we give two periods a week to it, what is learnt in one period will be forgotten before the next period arrived. Strike while the iron is hot.

The next caution is known as the *rule of sequence*. Each subject has to be developed in a systematic order with its own line of thought, its own technical terms, correlated as much as you please, but not swamped by the material. There should be an orderly progression, one thing leading to the other. The pupil, as he pursues the study should have some apprehension of the steps by which he is proceeding and should find a real intellectual interest, in recalling the results arrived at in the past and in anticipating the future programme. Thus Arithmetic should develop into Algebra and Algebra and Geometry into Trigonometry. This is why object lessons were considered objectionable and the disconnected matter in text-books for the study of Modern Foreign Languages was condemned.

The rule of sequence is concerned with the subject matter, the *rule of Continuity* with the pupil. If success should be achieved, the process of study should be prolonged. The pupil's study should not be frequently disturbed by short term promotions or by change of school. The year's work should be devised beforehand and the class should cover the ground steadily, continuously. The aim of the teacher is not to rush the pupil, but to see that he goes through the several parts of the curriculum (*Findlay loc. Cit.*).

Origin of Studies.

All knowledge is one. The fact that it has been divided into different subjects is due to two circumstances. Firstly convenience demands differentiation. An undifferentiated mass would be unmanageable and unless divided into smaller masses it could not be useful for practical purposes. Such differentiation can be observed as taking place in historical studies. History is the mother of the sciences. In ancient days all kinds of phenomena natural, social and political found mention in it. Pliny mentions e. g., that blood fell as rain at Corioli and that a cow was heard to speak at Privernum. Gradually one science after another left its

fold, the most recent to leave were Law, Politics, Sociology, Economics. This is because as the data of each of these sciences grew, they could be better dealt with separately and thereby advance more rapidly. Secondly, there are intrinsic differences in the data supplied by the several senses. Thus colour is different from taste and smell. Even in the same sense the impressions received are different Thus as regards colour blue is different from red. These are the inherent fundamental differences in the world itself, which are reflected in our perceptions. The elements of our experience are not uniform like the ocean but multiform like the land. Indeed this is the very pith and marrow of our knowledge: or in other words we know a thing only as being different from other things.

The mode by which the various subjects differentiate themselves, is by subject matter grouping itself, each under a different core. This core of thought or activity is known as a *node*. The node is the criterion for the selection of material. Thus problems of mass and force group themselves under Physics. The node of Psychology is consciousness. These nodes are either theoretical or practical. The theoretical is a node of impression ; while the practical is one of expression. In the theoretical the subject matter is arranged in the logical manner, because the material is uniform; in the practical it is arranged anyhow, arbitrarily, as the material comes from different sources, the criterion being its applicability to the problem in hand. Hence the theoretical nodes are the sciences ; while the practical are the applied sciences. Thus Physics admits within its ambit only matter relating to mass and force while Medicine or Teaching obtains diverse material from many sciences. With all that subjects are not sharply differentiated one from the other: and their boundaries merge. It is a mark of the good teacher to recognise the inter-dependence of all knowledge.

Knowledge being thus differentiated into subjects, it is useful to bring it back again into a few inclusive groups. The Herbartian classification is as follows:- 1. The facts and laws of nature observed and formulated by the mind ; but not dependent on it for their existence e. g., Natural Science and Mathematics 2. The linguistic, artistic and institutional constructions that have their genesis in the thoughts, feelings and volitions of man-kind, known as the Humanities. 3. Knowledge of the ultimate or philosophy. We should distinguish between "Form" and "Content". The facts which form the domain of a science are known as its *content*. Thus the content of Psychology is consciousness, and of Botany,

plants. *Form* is the instrument by which content is investigated. Thus Grammar and Rhetoric are the *Form* of Language and Literature. The Form subjects are Abstract Sciences, since they are abstracted from concrete material. We should also distinguish between knowledge and skill, the latter giving us the Practical or Expression subjects. These have come into the curriculum recently owing to the cry for a practical education, to the belief in their capacity to educate, in response to the psychological contention that expression is indispensable for impression and because of their socialising and liberalising effects. The three vertical and the three horizontal divisions give us a nine-fold classification. The sciences give us comprehension of the world, free the intelligence from the bondage of superstition and fear and promote open-mindedness. They cultivate the mental powers of observation, inference and insight and they train the powers of abstraction i. e., of making concepts and formulating laws from particular examples. They train the student in getting knowledge first hand from nature and arouse his curiosity and acquisitiveness and disclose man's powers to himself. The humanities appeal to our emotions. Art teaches us the capacity to appreciate beauty, makes us beautiful for the nonce, discards the ugly and removes it from existence. Literature widens human experience by presenting typical and universal human characters, by idealising the real and realising the ideal, by giving us self-knowledge and by being didactic. The volitional studies prepare for citizenship, teach the pupil his place in the world, trains the judgment and gives acquaintance with the institutional environment.

Educational Values.

Man's life is varied and complex and no one study will put him in touch with it all along the line. A study generally has only one conspicuous value, and several others that are subordinate. Therefore there should be many studies to realise all the values of life. However, several studies have some values in common and hence, they could be grouped together.

In respect of other studies, every study may be said to have a *Preparatory* value. The three R's open the gateway for all the studies that follow. Only if a person can read and write, can he at all make headway in learning. Arithmetic prepares the way for Algebra, Geography for History and History for Literature. The characteristic feature of a Preparatory Study is that the substance of one study is used as

such, in the pursuit of another study. Thus Mathematics as Mathematics, is used in the study of Physics ; and Chemistry as such is used in the study of Physiology. There is another value which is almost identical with this. Thus Physical Geography is often said to be preparatory to the Sciences. This does not mean that principles yielded in its study, are used as such in the study of the Sciences. It only means, that a little of Botany, Zoology, Physics, Chemistry are actually studied in it, Thus it introduces us to a number of studies and is therefore said to have an *Introductory* value. This principle is commonly acted up to in Literature, where Lamb's Tales introduced to Shakespeare, stories of Arthur to Tennyson and abridged editions to the full works of the authors. These two values, the Preparatory and the Introductory, arise out of the principle of Apperception. Ideas are assimilated only on the bases of previous ideas. The data on which the comprehension and interpretation of other data depend, should be given first. These values hold only in the class room and not in life.

The *Practical* value refers to life outside the school. It is connected with the securing of protection, food, clothing, shelter, communication and locomotion. It is synonymous with the Utilitarian value. It may be individually practical or socially practical. When knowledge is applied directly by the person himself to secure these ends, it is directly practical, as when a man uses his knowledge of Hygiene to escape small-pox. When a person uses knowledge through public or semi-public agencies, or on professional initiative, it is being indirectly socially practical, as in the case of a person who gets the aid of a physician in illness. Protection, food and the other wants can all of them in this fashion be satisfied either individually or socially. This value has reference to the function that studies have in meeting our physical needs and conveniences They are believed by many, to have no educative value.

Knowledge benefits society through changing the disposition or attitude of the persons subjected to it. In matters of public health, the dissemination of knowledge, is a fundamental fact in furthering the efforts of the State or experts. Otherwise people may even object to State expenditure on them. Thus as regards sanitation, the greater the general knowledge of the people, the easier it is to make them resort to hygienic ways of living. This is the *Socialising* value of knowledge. Social insight gives rise to social sympathy and moral support. In the present stage of society,

with its highly organised division of labour, we are apt, to become cogs in the wheels of a great machine and come to lose touch with life in all its aspects. The town child for example knows very little of the country. In olden days all that was needed for life was produced in the house itself. Now industry has been transferred to the factory and each person is engaged in a microscopically small bit of activity. Therefore the school must supply the necessary link. (Dewey: *School and Society Lect. I*). Thus excursion to a farm, Manual Training, Geography, and the novel extend our vision and widen our outlook, and in doing so create social insight, social sympathy and moral support. Knowledge produces toleration of political and religious distinctions. This is a value greatly in evidence in the study of history. The study of the language and history of a people produces sympathy for them. Byron died for Greece and cultured nations have a soft spot for France and India because of their past achievements.

The moral value is a species of social value but is narrower and refers to the value that studies have in establishing a moral character. Thus certain studies promote honesty, reliability, perseverence, and all studies take people away from baser pursuits.

Knowledge has also a *Conventional* value. That is, a certain kind of knowledge is expected of people who belong to a particular class of society. It gives the community of ideas needed for social intercourse, and a common basis for social enjoyment. It is thus ornamental and has an index-value indicating breeding and culture. It is a decoration for the people who possess it, and indicates their place in society. Thus, in the time of Locke, a gentleman was expected to know, both Latin and Greek and to possess a good pronunciation and correct grammar. It is harmless enough, but when used as a means of winning in social rivalry and social approbation, we should condemn it. It can never have a Primary value, but only a Secondary value. That is to say, no one could insist upon the inclusion of a particular subject in the curriculum because of its conventional value; but only if it has some other conspicuous value also. The socialising, the moral, the socially practical, and the conventional values, have all been grouped together and called the *Social Value* and said to mean the achievement of social benefits.

The Preparatory, Introductory, Practical, Socialising and Conventional values, may be grouped together as *Instru-*

mental values. A study is said to have instrumental value when it is pursued not for its own sake, but for achieving other objects that we may have in view. Thus, a doctor studying German uses it only as an instrument to get at the medical knowledge stored in the German language. Thus the Preparatory, and Introductory studies help the acquisition of other knowledge, the Practical help in utilitarian ways, the Socialising are a means of social and moral responsiveness, while the Conventional value assists in social intercourse. These are therefore, in the words of Lord Avebury, knife and fork studies. At the same time, there are studies which lead to nothing else, but which are appreciated directly for their own sakes regardless of any ulterior benefits that they may bring. These are known as *culture* studies, or if we continue the metaphor of Lord Avebury, we should call them the dinner studies, (Adams : *The New Teaching* p. 47). These studies yield the higher intellectual and aesthetic pleasures and are chiefly useful for the enjoyment of leisure. The *Cultural* value includes two distinct values, the *Liberalising* and the *Sentimental.* The latter applies to the pleasure that results from the exercise that studies give to the feelings and the former applies to the pleasure that accompanies intellectual insight. Examples of the former, are the pleasures found in Astronomy and Science; and of the latter, the capacity for the enjoyment of a picture, a piece of music or a poem.

The Sentimental value takes four forms, and appeals to the aesthetic, the comic, the social and the moral sentiments. The aesthetic sentiment is appealed to by Drama, Literature Music, Painting, Sculpture and Architecture. They have a conventional, socialising and recuperative value. They chiefly add to the richness and delight of life. The *Liberalising* value has its roots in curiosity. In man this instinct is developed in a high form of mental activity called the power of rationalisation. Man craves not only to know things, but to resolve his knowledge into a consistent system. This has given rise to philosophy and the sciences. A liberal education is one that makes the mind free. Superstition disappears. Natural phenomena, no longer create fear. "Thou shalt know the truth, and the truth shall make thee free." This value is most conspicuous in the sciences because they teach the truth about reality. The aim of education can be achieved through these values. The instrumental values give the intelligent mastery, the liberalising values give the harmony and the sentimental values give the appreciation of the environment.

The Elementary School Curriculum.

The school has been divided into separate departments, Primary, Elementary, Secondary and High. This division appears to tally with the psychological divisions of child growth. At no time is the child markedly different from what he had been, say a year before; but there are two well-marked stages—one at the close of infancy and the other at the onset of adolescence. Between these two stages he has almost undergone a revolution. Therefore three well marked stages are observable. Childhood is between 4 and 9; boyhood between 10 and 16. Our schooling begins at 5 and the primary grade is over at 9-10, the Middle or Secondary stage is between 10 and 16 and the High stage, corresponding to our Intermediate, between 16 and 18.

At about 3 years of age, the normal child can walk and talk, and in general comport himself, like a miniature human being, and the State ordains, that he may enter upon school life. When he gives signs of readiness to pass from primary to secondary interests—from seeing and hearing things to reading about them—from saying things to writing about them—when he can attempt to do these things without injury to eye or hand, and to sit at such work in desks for somewhat prolonged periods without detriment to his body he is no longer an infant. This period is reached ordinarily between the 6th and 7th years.

From the very beginning of life, the human being comes into contact with the world through his senses, and by their means gains hard concrete experiences, which are the foundation of all future knowledge. At the same time he reacts to these sensations and therefore there is a necessity for combining reception with reaction. At first the circle of this receptive-reactive process, is concerned with his immediate environment. Then the remote environment outside the circle created by the senses, exercises its attractive influence, which is hastened by the arrival of the power of speech. We should, therefore, follow this order laid down by nature in prescribing his studies. First, man, nature, the common objects in the school and the household, should be used as materials for his observation, then as speech develops the second hand material found in literary and historical stories and in tales of the little people of other lands. So much for the receptive aspect.

On the reactive side, first the reaction of the larger muscles should be encouraged. Thus he must play games,

run, tumble, dance. Then gradually the small muscles should be brought into play. He must be allowed to carry and handle things, and to perform useful activities with common utensils. Then he will be introduced to drawing, painting and modelling. His craving for expression will be satisfied in story-telling, dramatisation in reciting and singing through speech and gesture. Reading and writing, being non-natural activities should not be taught so early. They are symbolic, and we should take the transition from the natural to the symbolic as marking the end of infancy. Ideas of number should be obtained in an incidental manner. In passing frcm one object to another, they get notions of size, weight, length, distance and shape. Games and occupations should lead to ideas of Arithmetic and Geometry.

Curriculum of Secondary Schools.

Until 12, the general education given hardly indicates what particular fields the child would follow. But by 14 more and more specific tendencies begin to appear and it is clear whether the boy has literary, scientific or mathematical interests and powers. The realities of life appeal to him and act as purposes drawing him in special directions. However, many of these purposes are of a transitory nature and so, would constitute unsafe guides. By the age of 16, his uncertain interests take permanent shapes. Up to 12, he adjusts himself to the fundamentals of his immediate and remote environments. From 14, he becomes aware of general tendencies and during 14—16 he will be feeling his way for his special powers and at 16 he discovers what these are. Between 10 and 16 therefore the education must be general and many-sided dealing with fundamentals. There should be no studying one subject deeply to the exclusion of others for our motive is that the pupil should find himself. Secondly the curriculum should imperceptibly develop from breadth to depth, from broad features to details, from outlines to light and shade. Therefore the Secondary School Curriculum, up to the age of 12 must be quite general ; between 12 and 15, it should still continue general ; but it makes some provision for certain observed tendencies towards Mathematical, Scientific and Linguistic studies. From 16 years onwards specialisation should be insisted on, until the 16th year Language, History, Mathematics, Literature, Science, Drawing, Games, Physical Exercise, Manual Training, Singing &c., should receive continuous attention. Then a two years' course either in (a) Science and Mathematics (b) The classics (c) Language

and History, along with instruction of a general nature should be given. This is exactly our curriculum. Boys begin schooling at 5, the Preparatory is over at 9—10, Third Form 12—13, and the School Final at 16. From 5 to 9-10 they have fundamentals taught by practical methods, until 13, they continue to have the general minimum of fundamentals. Then there is a tentative specialisation, either in Science, History or in Mathematics without the other subjects being dropped. Between 16 and 18 in the Intermediate there is specialisation of a more pronounced type. It is advisable that the Elementary and Secondary curricula should be continuous, so as to select boys of ability into the higher grade. Among us the vernacular school is made continuous with the English School mostly for this reason.

Educational Psychology.

Psychology and Education.

James: *Talks to teachers Lect. I.*
Munsterburg: *Psychology and the Teacher pp. 81-99.*
Ross: *Educational Psychology Chap. I.*
Horne: *Psychological Principles of Education Chap. VI*;
Welton: *Psychology of Education, Chap. I.*
Dewey. *Educational Essays No. 3.*

Psychology is the science of the mind and the business of the teacher is with a growing developing mind. Therefore it is natural for the teacher, to look for great help from Psychology, in the active pursuit of his profession. In fact, it is the science on which his art is based just as Physiology is one of the sciences on which the art of healing depends. This close dependence has led teachers to expect too much of Psychology. Such exaggerated expectations are foredoomed to failure, partly because of the short-coming of Psychological science, but chiefly because of the nature of the teacher's profession. Psychology is no finished science. Talk of the "New" Psychology may lead us to think that there has been a wonderful revolution in our knowledge of the mind; but this is not true. Much of our knowledge of the mind is as old as Aristotle and all the great philosophers have contributed their quota of enlightenment. It is only recently that the science has escaped the clutches of speculative philosophy and taken to the Experimental Method.

Still it is true to say that Psychology has made greater advances during the last fifty years than in the past two thousand years (Sandiford. *Educational Psychology* Int.). To lean on such a science yet in the embryonic stage, is to lean on a broken reed. If the pure science is still in the formative stage, the applied sciences based on it are yet in the making. Teaching most naturally looks to the applied branches for radical help: and these are growing up only with the growing need for psychological truths in the practical activities of the times. Up till recently Psychology was far too individualistic and intellectualistic, being gathered from the analysis of the adult mind. When applied to education, the former led to the naturalistic education of Rousseau, which attempted to evolve man in isolation, and the latter to the fallacies of the formal disciplinists. Since man is to be educated to live and move as the member of a society and since a boy is as different from a man as a tadpole is from a frog, educational doctrine shall have to wait on the advance made in Social Psychology and in Child or Genetic Psychology.

Again Psychology is a science, while teaching is an art; and sciences do not generate arts directly out of themselves. An intermediary inventive mind must make the application by using its originality. This does not mean that there should be a middle man between the Psychologist and the teacher whose function would be to coin pedagogic precepts from psychological truths, which the teacher in turn would apply to his practice. If the teacher does not make the adaptations himself but merely borrows rules, his profession would soon degenerate to rule-of-thumb unintelligent methods. The mediating science would not connect with his consciousness but only with his outward actions. Then he cannot be free; but will become the slave of his methods. What is meant is Psychology being the science of the mind's laws is not something from which we can deduce definite programmes, schemes and methods of instruction for immediate school-room use. The teacher could not borrow psychological principles *en bloc* and hope to suceed in his work. The science of Logic never made a man reason correctly; the science of Ethics did not enable anyone to behave rightly. A science only lays down rules within which the rules of the art must fall, laws which the follower should not violate or transgress. But there may be many different ways of being right within the rules. Pedagogy arose within the class-room by concrete observation and sympathy and was not dictated by Psychology. The Omega of Psychology is but the Alpha of Pedagogy, The law of apperception

says that old knowledge influences new and assimilates it. The teacher under the influence of this law draws the lesson for his work that every piece of new knowledge has to be prepared for, presented in relation to the old, and recapitulated to reveal inner relations.

Moreover, the bounds of educational theory transcend Psychology. Psychology being a science takes facts as they are and cannot evaluate them. Its scientific interest is as much excited by moral depravity as by saintly holiness. Not Psychology but Ethics condemns the one and approves of the other. Therefore Psychology can say nothing as to the ultimate aim of education. A "Psychological education" is therefore a contradiction in terms, as it will simply allow the child to grow free and wild, without curbing the undesirable or cultivating the desirable. Not merely Ethics but Logic also has much to say on education; and it goes without saying that no amount of psychological knowledge can form a substitute for knowledge of the subject that is to be taught by the teacher.

It is also urged that, the teacher's attitude towards the child being concrete and ethical is opposed to the Psychologist's which is abstract and analytical. The two positions may be illustrated by the case of a doctor who sees a lunatic in the street in whom he is interested as a case. He is not interested in the lunatic's personal concerns except in so far as they elucidate the case. The same doctor goes home and meets his little daughter. The scientific attitude falls away from him and he is only the fond father. In the same way the psychologist deals wlth a generalised mind; while the teacher's task is with individual minds and whole personalities for whose aims he has sympathy or dislike. The teacher must often oscillate between the two attitudes. Thus if a poem is to be learnt by heart the teacher might either hope that his enthusiasm and emotion would be infectious or he may try to secure his end by making use of the devices which psychology recommends for effective memorising. To maintain these two conflicting attitudes is difficult. We cannot observe our pupils as psychical mechanisms and retain for them the same personal interest. Hence it is far better to secure the ability to psychologise and develop an insight into child mind than to put on the attitude of the abstract psychologist. What is wanted is a power of divination and perception, and a happy tact for meeting the concrete situation and not psychological pedagogics.

However, Psychology narrows the field for experiment y telling us in advance what methods will be wrong. We

are clear as to what we are about and we get confidence about any method that we follow, when we know that theory is behind it. It also gives us a certain amount of independence to have two views of our pupils, and while handling him with all the concrete tact in our power, to be able to represent to ourselves the inner working of his mental machine. Psychology could tell us of the nature of the educand and how it is influenced by the educator and the educational environment. It can also teach us how knowledge systems are built up. So it can radically help us as a means of education.

Psychology.

Woodworth: Psychology Chap. I.
Dexter and Garlick: Psychology in the classroom Chap. I.
Glover: Know your own mind.
La Rue: Psychology for Teachers Chap. I.
Strong: Introductory Psychology for Teachers Chap. I.

Psychology has been variously defined. Some time ago it was deemed "the science of the soul," or "the science of the mind," later as "the science of consciousness," the latest being "the science of behaviour." The first has been abandoned because the term soul has a theological tang about it, and suggests problems which till now have defied investigation. "Science of mind," implies a static condition, something like a machine to be observed where there is no such thing. Psychology is more a study of actions rather than of things. "Science of consciousness" would not cover the whole field, for we find it necessary to study unconscious actions also. So too, "behaviour" leaves out consciousness and so is only part of the subject. Most of these definitions have erred by defect and their failure to explain the nature and scope of Psychology has been waggishly expressed as follows: —"First Psychology lost its soul. Then it lost its mind. Then it lost its consciousness. It still has behaviour of a sort''. It is well not to be squeamish about a definition. We should describe Psychology simply by the kind of knowledge it tries to achieve. It is the science which describes, classifies and explains our mental operations. It tries to know how we observe, learn, remember, imagine, think? What sensations and feelings we do have, what emotions, what instincts, what natural and acquired impulses to action? How are our natural powers and impulses developed and organised as we grow up. Psychology is concerned with the child and with the adult, and even with the animal, with the abnormal and the normal human being

There are two methods by which Psychological truths are arrived at—the subjective and the objective. The subjective method is also known as the introspective method. It is the observation by an individual of his own conscious action. The mind is turned upon itself. In one aspect, the knowing aspect, the mind is active; in another aspect, the known aspect, it is passive. In one aspect the mind is the subject of observation, in another the object. Naturally the part that is observing cannot observe itself. It is like turning up the gas to see what the darkness look like. Spearman says that the attempt to localize exactly a pinprick produced a mean error of 134 m m which was reduced to less than half when the localizing was done with natural negligence (*The Abilities of Man* Chap. *VIII*). Again we cannot hope to make minute observations on any process that lasts only a very few seconds; for we must let the process run its natural course unimpeded and then turn our mental eye on it retrospectively. This is against human nature, which does not like to retrace its steps after reaching the goal; but wishes to proceed further. The method is also subject to an element of error, as different people report differently about the same fact, owing to subjective considerations. Our observations are subtly coloured by our own feelings and opinions.

The objective Method is also called the Method of Observation or the Experimental Method. In objective observation, the observer is watching something else and not himself. In animal, abnormal, and child psychology we can learn about the mind only by the behaviour it gives rise to. The Experimental Method is one branch of the Objective Method. We observe the force of one element by isolating it from others. Thus a poem may be conned over while the subject is fresh, and another and similar poem by the same person after the day's work. The number of repetitions required in each case may be noted and the result would give us some insight into memorising methods. These are success experiments in which the result is measured. Processes are observed, when experiments are devised to find out the physical concomitants of mental actions. Thus through the X-ray the results of anger on a cat's physical processes of digestion may be observed. Finally, every mental test is an objective way of observing mental phenomena. Even this method is not free from subjective errors. Bertrand Russell remarks that animals which have been observed have "all displayed the national characteristics of the observers. Animals studied by Americans rush about frantically, with an incredible display of hustle and pep, and

at last achieve the desired result by chance. Animals observed by Germans, sit still and think and at last evolve the solution out of their inner consciousness."

Consciousness.

Adams: Herbartian Psychology pp. 28-106.
Glover: Know your own mind pp. 29-85.
James: Talks pp. 15-32.
Betts: The mind and its Education pp. 1-14.

Roughly speaking, we may say, that the subject of study of Psychology is consciousness. There is always going on within us, a stream of consciousness. It has its rise at the cradle and its end at the grave. It is verily a stream; for the mind when we look at it, is a process rather than a thing. It is always changing and moving. The stream is irresistible. We may stop thinking and then it only changes its direction. Just like a stream, it is unbroken from source to destination. If we look into our minds at any moment, we see only a portion of it, anon it is changed and another had succeeded it. Thus it chops and changes. The thought of a moment ago, is gone not to return. The surface of this stream is not smooth. There are elevations and depressions. Hence we speak of waves of consciousness. This is because one thing is always more prominent in our minds than the rest. Let us peep into our minds at any one moment of our lives; for example when we have gone into a shop to buy a knife. At first the whole shop occupies our consciousness; but when we get the knife, the mind is conscious of it alone, the shop receding into comparative oblivion. Supposing a book strikes our eye, everything else disappears. Hence consciousness is often likened to a field with a centre or focus and a margin. Centre and margin frequently interchange. Thus in the previous example the knife is at the focus for a moment and then gives place to the book receding itself to the margin. Others compare consciousness to a dome. The object occupying the attention for the moment, being at the top while the others are at the bottom. Thus for a moment the shop was at the top, then the knife and finally the book, the other two dropping down to the bottom.

It is by means of consciousness that we are aware of our surroundings. Hence it has also been spoken of as mental awareness. If we analyse its contents, we discover that it consists of three different kinds of components. We can discover the ingredients of consciousness by means of illustrations. A lecturer is announced to speak to us in the

College Hall, about a famine. We do not know the country afflicted, and take our seats in an indifferent attitude of mind. But the speaker is well-informed, graphic and effective. We are interested. He describes the desolution, paints the picture of the suffering, and appeals to our sympathy. We feel pity. In the end he solicits some form of practical help and we subscribe our mite. Here we discover three different ways of being conscious. The mind comes to know of the facts about the famine stricken country. It is cognitive. It feels sorrow and sympathy for the suffering. It is affective. The knowledge and feeling lead to some kind of action and willing. It is conative. Knowing, feeling and willing are the components of the mental stream. Any mental act may be said to involve these three primordial elements. I hear a friend has passed an examination—knowing. I feel happy—feeling. I dispatch a telegram of congratulation—willing. These three are properties of the mind and cannot be separated from it any more than the weight, shape or colour of a stone can be separated from it. Human life tends to express itself in terms of thought, feeling and action.

This stream of consciousness has obviously two functions. It leads to knowledge and it leads to action. The emphasis on either of these functions has varied with the times. In the olden days the knowledge giving function was stressed, while at the present day mind is largely looked upon as given us for action. Philosophers have held, that man's supreme glory is to know the absolute and the eternal. The theoretic life is man's chief concern—the withdrawal from the heat and strife of common day, to the peace and quiet of inner contemplation. This was the ideal of Plato and Aristotle and the whole classic tradition. It minimised the life of achievement and glorified a life of contemplation. It was thought legitimate to "annihilate all that was made to a green thought under a green shade".

Naturally therefore, much attention was devoted to find out the way in which the mind added to its knowledge or performed its knowledge giving function. Plato said that the stream of consciousness was the reminiscence of our former life; Descartes' that it was inborn in us. Locke attacked this theory of innate ideas. He compared the mind at birth to a sheet of blank paper which the senses later filled with writing. There was nothing in the mind, not previously in the senses. The senses are the gate-ways to knowledge. Therefore Locke said that the only way of studying the mind was by turning it upon itself or by means

of introspection When Locke in this manner looked within, he discovered that the mind was constantly changing itself. He was not able to make explicit the laws of this mind change and therefore believed in successive states of the mind. This was later explained by the Associationist school of psychologists. Moreover though Locke got away successfully from innate ideas, he was not able to get away from innate faculties. He could for example, explain how the mind got the idea of "red," but he could not explain, how it made the idea "colour". In order to do so, he endowed the mind with a faculty called the faculty of abstraction This is merely giving names, and no explanations at all. To say that the mind, remembers because it has a faculty of memory, is to perpetuate a meaningless tautology. It amounts to saying that the mind remembers because it remembers In this manner Locke had to endow the mind with a number of different faculties The faculties were credited with all the work that went on in the mind. (See Mac Dougall ; *Outline of Psychology Introd.*)

Herbart accepted Locke's theory of the nudity of the mind at birth. He said that, it was a homogeneous whole without any special parts and had only two qualities—the power of reacting on impressions and *vis inertiae*. The second quality made it sluggish to change and sluggish to go back to the original state after a change. This conception of the mind at birth involved the theory of initial equality. According to Herbart, all minds are born equal; so that the mind of the genius started from the same level as that of the village clodhopper. Such considerations carry with them the inevitable corollory that the mind is largely built from the outside; and a condemnation of the belief in innate ideas. So far Locke and Herbart agreed; but Herbart condemned the theory of innate faculties as well. Till then the problem was to find out how the mind made the ideas, or the mind stuff which went to constitute consciousness. The mind was taken as given, the search was for the ideas, and as to how the mind made them. Herbart reversed all this. He started with the ideas, and the search was now for the mind. Philosophers had till then failed to explain ideas by the mind and he attempted to explain mind by ideas. In his theory instead of the mind making the ideas, it was the ideas that made the mind. Where Locke posited faculties for the normal work of the mind, Herbart gave such work into the hands of the ideas themselves and he proceeds to show elaborately how ideas performed this function.

Sensations, he said, were the units out of which the mental world was built. We get sensations of the outside world through our several senses. Thus rays of light from a piece of sugar reach the eye, impinge on the optic nerve which carries them to the visual area of the brain which reacts to a sense of whiteness. In the same way, when we taste it, the part'cles come in contact with gustatory nerves and we get a sensation of sw etness. Similarly, on taking it in our hand, we get sensations of mass and weight through our tactual sense. Our idea of sugar is thus made up of whiteness, sweetness and weight. It is not necessary for us always to go through the several proeesses to get the idea because it can be stored in the mind and revived in the presence of any particular specimen. Supposing we come across a lump of black sugar. The tastes of both are sweet and so they are *similar* ideas which undergo *fusion* and become deepened in consequence. So is the idea of weight or mass. But the colour black is *contrary* and so *arrests* the idea of whiteness. Finally the white sugar may be in a bottle, while the black sugar is in a sack. These two are *disparate* ideas and therefore complicate and form a *complex*. Our ideas of things are largely made in this fashion. That is why Herbart said "Presentations (ideas) of things are the complexes of their properties." The idea of sugar is a complex made up of its qualities or properties viz, sweetness, whiteness, mass. Ideas are not idle when once they are made They act upon other ideas, forming friendships with similar ideas, or contiguous ideas, and ideas which stand in relation of cause and effect, and fashion themselves into masses which are known as apperception masses. These masses exhaust our mental life and Herbart believed that even the will itself was an achievement and arose in consequence of these ideas or their welded mass, the circle of thought. He, therefore thought the great desideratum was the supply of these ideas and emphasised instruction, perfecting the mechanism therefor, in the five formal steps. Thus the growth of knowledge in the mind was emphasised. This was the German ideal in education. The great aim was to send out, from the universities, efficient agents of research, who provided the problem was set, will so attack it that in a short period they would grind out a peppercorn of new truth worthy of being added to the extant information on the subject.

Even Herbart laid it down, that knowledge should lead to action. He said "a man is worth what he wills, rather than what he knows." But it is the advent of evolution that is largely responsible for looking upon the mind as an organ

leading to action adapting life to the environment in which it is placed. There is considerable resemblance between plant and animal life; but there is also a fundamental difference, in that plants lack the power of adapting themselves to their surroundings. This difference is reflected in their anatomy. Plants have five systems—the digestive, circulatory, respiratory, excretory and reproductive—in common with animals. These are known as the *maintenance* or *vegetative* systems. They lack two more systems that animals have—the muscular and the nervous systems. These are the *adaptive* systems which adapt the organism to the environment. If the conservatory gets cold the geranium simply withers and dies; but the cat gets out and finds a warmer place, because it can feel the cold, wish for a change through its nervous system and bring about the change by means of its muscular system. We who have better nervous and muscular systems than the cat, can succeed better in such adaptation and not merely adapt ourselves to nature but adapt nature to our needs. (Read La Rue *Op. Cit.* pp. 25-54). These adaptive movements are largely for the sake of finding food. So it is natural that the mouth should go in front, and round about it should gather all the other organs of sense. Thus began the brain. Hence consciousness should be looked upon as a superadded biological perfection, useless unless it prompted to useful conduct. "Our sensations are here to attract us or to deter us, our memories to warn or to encourage us, our feelings to impel, and our thoughts to restrain our behaviour, so that on the whole we may prosper and our days be long in the land. The biological conception therefore brings home to us the fact, that man is after all, a practical being whose mind is given him to aid in adapting him to this world's life. Therefore the mind is more given to us to do, than to know; and education consequently should be for behaviour. This is the English ideal in education as embodied in Jowett's view of Oxford's duty to its students. He said "Oxford can teach an English gentleman *how* to be an English gentleman." This can be only in terms of conduct and behaviour (Read James *Talk*s Lects. 3 and 4).

Mind and Brain.

The relations between mind and body have been very puzzling. Some have located the mind in the pinaeal gland, others in the heart, others in the bowels, still others in the spleen. It is now known, that the brain is the organ of the mind. Several different kinds of proof can be given. Common observation tells us, that our consciousness or knowledge

of the outside world about us depends primarily upon the use of our senses. A person, born deaf and blind can never have auditory or visual sensations or ideas. The senses are physical not mental things. Therefore the most simple and fundamental operations of consciousness are bound up with the existence and activity of certain bodily organs. Again the expressions of the mind usually take the form of muscular movements. We hear a bell and our consciousness of its sound results in our going to open the door. (Angell : *Psychology* Chap. 2). It is well known that mental states are conditioned by brain states. A tired brain means a slow mind; and a rested brain, a quick mind. Stimulants have their influence on the mind; and emotions or feelings such as sorrow, have their effect on the body. Blows and wounds may destroy consciousness; and improper flow of the blood to the brain as in fever means delirium and a sudden cutting off, of the blood supply will bring on fainting Pathologically, autopsies have shown paralysis to be due to lesions in different portions of the brain. Anatomically, it is shown that afferent nerves lodge in the brain, and that the stimuli brought by them result in molecular changes in the brain which correspond to sensations in the mind and are redirected through efferent nerves to motor reactions. Vivisectionally, the loss of the brain in lower animals such as the frog, produces characteristic changes in conduct. Therefore the close correlation between the brain and the mind is apparent. (Horne : *Phil.* of *Edn.* p. 59). This is expressed in the saying "no psychosis without its corresponding neurosis." Were the histology of the brain and nerves sufficiently well known, we could speak of instincts, thoughts and feelings in terms of nerve structure and nerve action.

The fact of this close connection is easily conceded. It is only when psychologists proceed to make the connection plain and explicit, that they begin to differ. A bell is struck, the air vibrates, the vibrations are carried to the ear. This is physical. The auditory nerve transmits it to the auditory area of the brain. This is physiological. The brain reacts to a sense of sound. This is psychological. How the brain does this, is a mystery that no man can understand. Descartes attempted to solve the mystery, by positing a ruling soul. He said that man was a perfect automaton, a bete-machine plus a soul, a ghost carrying a corpse. Such an assumption would for ever remove mental facts to a distinct province of being, whose connection with psychological facts must be for ever inscrutable. To hold this view is to believe in Epiphenomenalism. Some do not believe in such a dissociation between body and mind, and hold that mental facts

are reducible somehow to the facts of Physics and Chemistry. As the liver secretes bile, so does the brain secrete thoughts wishes and feelings. Our body is made up of the familiar chemical elements and the chemical actions going on in the body are like other such actions. Why not then the human machine be explicable by physico-chemical laws? The cry uttered by a dog when beaten, is of the same order as the sound emitted by a bell when so dealt with. This is the mechanistic view of life. As against this Vitalism has shown that even the lowest forms of life are not automata but autonomous and self-determining (Nunn: *Data and First Principles* Chap. 2). Others treat the mind, as if it were a self-contained field of events and causation which have some inscrutable connection with bodily events, but play no part in determining them. This is the doctrine of psycho-physical parallelism. The reconciliation is effected by the conception of the *elan-vital*, or the drive or "the will to live" or the vital urge and by looking upon consciousness itself as a super-product of evolution (Nunn pp. 17-22). For practical purposes the study need not be carried so far. The opposition between mind and body is plain. Mind is spirit: body is matter. The two cannot be confused. To the question "What is mind?" the answer is "No matter"; and when asked "What is matter?" the reply is "Never mind." With all that, the brain may be looked upon as the machine of the mind. It is by the activity of the brain that mind is produced. We know that electricity is a spiritual intangible power; but the dynamo which produces it, is of the earth earthy. The brain therefore can be likened to a machine which can do its work only when fuel is supplied and refuse removed. The relation is essentially energic. The fuel is supplied through fresh blood, whose quantity and quality is determined by good air and good food. It has been discovered by experiment that a flow of blood takes place to the brain when the mind is exercised. Make a child lie down on a horizontal plank finely adjusted on a vertical support. Give the child a sum to work out and at once that part holding the head will go down, proving thereby that blood had flowed into the brain. The body therefore supplies energy to the mind.

The Nervous System.

James: Psychology 28-133.
Woodworth: Psychology Chaps. 2, 3 & 10
Dumville: Psychology Chaps. 2 & 4.
Dexter and Garlick: Psychology Chaps. 1, 4 & 5.
Angell: Psychology Chap. 2 La Rue Psychology Chap IV.

Since the nervous system forms the physical basis of all mental operations, a knowledge of its structure and functions is indispensable for the student of the mind. Our nervous system consists of two main divisions, the cerebro-spinal system and the sympathetic system. The latter is situated on each side of the vertebral column and is chiefly engaged in controlling our bodily organs. It has very little to do with our mental life, and therefore need not detain us any further. The cerebro-spinal system consists of three distinct classes of organs. (1) The central organs consisting of the brain and spinal cord. (2) The end organs situated in the sense organs, muscles &c. (3) The connecting organs joining the two composed of the *afferent* nerves taking impulses *to* the central organs and the *efferent* nerves taking impulses *from* the central organs *to* the end-organs.

The structure of the nervous system is uniform, the unit being throughout the *neurone* or the nerve cell. A neurone is a protoplasmic cell with its branches. The cell is a microscopic speck of living matter of various shapes, triangular, pyramidal, cylindrical and irregular, with a nucleus in the centre. The general function of the cell is to generate the nervous energy responsible for our consciousness and its results, as is seen from the fact that after continued exertion it is found to be diminished and shrunken in size. The neurone fibres or branches are of two kinds, the *axon* and the *dendrites*. The dendrites are short tree-like branches. The axons on the other hand, are very long often several inches or feet in length. They are slender and branch but little and only at right angles, and their terminals consist of either a flattened plate or a fine brush-like tuft. The axons are pure white in colour, while the cell-body is grey. Some say that there are about 11,000 million neurones in the system, while others that there are only 3,000 millions. At any rate it would take a life-time to count them. The fibres are so fine, that they would become visible to the naked eye only when the brain is magnified to the size of the dome of St. Paul's Cathedral. The mode of connection between one neurone and another is known as a *synapse*. The axon of one neurone, through its end brush, is in close contact with the dendrites of another neurone. There is contact, but no growing together, the two neurones remaining distinct. But the junction is so close that a nerve current passing from the axon of one cell to the dendrites of the other, throws the latter into agitation and thus communicates the impulse. The dendrites are receiving organs and not transmitting organs, so that the communication across the synapse is

always in one direction, from end-brush to dendrites and never the reverse.

The brain is encased in the bony skull or the cranium and is made up of several parts, such as the cerebrum, the cerebellum and the medulla oblongata. The cerebrum, situated in the upper and front part of the cranium, consists of two hemispheres separated by a fissure. Its surface is much convoluted. The grey matter is external, the white internal. It gives off twelve pairs of nerves of which the olfactory, the optic, the auditory and the glossopharyngal are the most important. The cerebrum is the seat of the intelligence and the higher processes of the mind. Injury to the cerebrum destroys the latter. The larger the cerebrum the greater is the intelligence. The cerebellum, is otherwise called the little brain. The grey is external and the white internal. Its function is the regulation and co-ordination of muscular movements. It does not originate these movements. That is the function of the cerebrum, but it carries them out. Disease or destruction of the cerebellum leads to partial or total lack of movement. The medulla oblongata is pyramidal in shape and is the bulb or prolongation of the spinal cord. The grey is internal and the white external. It is the conductor between the spinal cord, and the cerebellum and the cerebrum, nerves passing to and fro decussating, so that nerves from the right side of the body go to the left of the brain, and those from the left to the right. It controls respiration, circulation. swallowing &c. The spinal cord is the cord like nervous tissue that fills the canal inside the vertebral column and is about 18 inches long. It gives off 31 pairs of nerves. Each nerve has two roots, an anterior and a posterior, the latter having a ganglion. The grey matter inside is in the shape of a crescent, the four horns of which form the four nerves. The posterior root is the sensory while the anterior is the motor root The spinal cord is a conducting medium for nervous impulses and is the centre of reflex action.

The end organs are either muscles or sense organs. The motor nerves which are the efferent nerves, always end in muscles which carry out the behests of the mind. The sensory nerves or the afferent nerves take their rise in sense organs and connect them with the central organs. The sense organs are highly specialised. Thus the sense of touch is located in certain parts of the skin. The skin consists of two coats—the outer and the inner coats. The outer coat consists of epithelial cells and has no blood vessels. The inner coat is well supplied with blood vessels and nerves. In it are situated the papillae which

may be regarded as the organs of touch. They have the touch corpuscles which are the end organs of afferent nerves. Pressure on them is carried to the brain by the nerve and we have a sensation of touch. The sense of taste resides chiefly in the back part of the tongue and palate. It contains flask-shaped bodies termed taste bulbs or taste-buds. Each taste bulb has a number of gustatory cells in which nerve filaments from the glossopharyngal nerve terminate. When the substance comes in contact with these nerve-endings the excitation is carried to the brain which reacts to a sense of taste. The organ of smell is the nose. The complicated upper cavities formed by the nasal bones are covered with mucous membrane containing olfactory cells to which minute fibres of the olfactory nerves are distributed. These carry the excitation to the brain which gives rise to a sensation of smell. By a complicated arrangement of lenses and chambers light from the outside world is made to impinge on the retina of the eye which is well supplied by threads of the optic nerve and which give rise to the sense of sight. As regards hearing, the vibrations of the air impinge on the drum and throws it into vibrations which are transmitted by the auditory ossicles to the membranous labyrinth of the inner ear. This contains a liquid which has a good allowance of auditory nerves. Hence the vibration is carried to the brain which reacts to a sense of hearing.

In the nervous system also we find that efficiency is considerably increased by division of labour and specialisation. In the lowest type of organism such as the amoeba we have no separate organs for respiration, digestion, assimilation, elimination, etc. But in the higher forms, each organ not only has its own specific work but even in the same organ there is specialisation. The nerve cells only generate energy while the nerves carry them. Each one of the several component parts of the nervous system has a separate function to perform. Finally all consciousness resides in the cortex. Even within it localisation of function is the rule. Certain areas are devoted to sensations, others to motor impulses and others to higher activities. The front portion of the cerebrum is devoted to thought activities; the region on both sides of the fissure to motor activities and the lower parts to sensory activities; while all work by means of the association fibres. The higher thought activities are not probably further localised into feeling, willing and knowing; but the motor and sensory areas are thus localised. In the sensory region one area is devoted to vision, one to hearing one to taste and smell, one

to touch. In the motor region one small area seems connected with movements of the head, one with the arm, one with the leg, one with the face, and another with the organs of speech. Here the specialisation is so minute, that by experimenting on monkeys such minute areas as those concerned with the bending of a finger or the flexion of a leg have been mapped out.

Once we recognise that the nervous system is the seat of our mental operations we should easily concede that all education should begin with improving its efficiency. We who are so much taken up with the idea of education as consisting of book-learning are apt to be wonderstruck with the title of such a book as Halleck "The Education of the Central Nervous System." The mind cannot be trained except as the nervous system is trained and developed. For not sensation and the simpler mental processes alone but memory, imagination, judgement, reasoning and every other act of mind are ultimately dependent upon the nervous system for their efficiency.

The efficiency of the nervous system depends, on three factors hereditary endowments, the development of the cells and fibres of which it is made, and the general tone of health and vigour. The last will be examined under Hygiene and the first under instincts; while the second can be dealt with under motor education. But we can now speak of the possibility of the nervous system being developed. Perhaps the number of nerve cells and fibres are the same in that of the genius and the ordinary man; but many of these cells do not develop and reach maturity in all cases. In the child there are a number of granules and neuroblasts which become developed cells later on. The nerve fibres too, are developed in the same fashion. At first the cells do not throw off branches, but as they grow they do throw them off. When the fibres are undeveloped the connections are not properly made, and the impulses are not transmitted accurately. Thus the child's clasping is developed before walking, because the nerve fibres for the latter are not yet developed. The conditions under which both motor and sensory development depend, are a rich environment of sights and sounds as proper stimuli to the sense organs, and opportunities for the freest and most complete forms of response and motor activity. The result of the lack of effective sensory stimuli, is shown in the case of Laura Bridgman who after three, lost her hearing. and the sight of the left eye from an attack of scarlet fever. In her 8th year she also lost her right eyesight. When she died in her 60th year, her brain was examined. The whole cortex

was discovered to be thinner than normal, and the visual area for the left eye was found to be much smaller than that for the right eye. The areas for the other defunct organs were also smaller. So it is apparent that the brain develops with use.

When we look upon man as a reacting machine—reacting by motor expression in response to impressions from outside, through the mediation of the brain, we come to look upon the paths by which impressions are carried in and expressions sent out, as determining the efficiency of the brain. Now, when a path has been used frequently, recently or intensely the synapses discharge the impulse much more easily and swiftly. Thus come to exist preferred paths; and the mind begins to take on a characteristic set. This is at the bottom of stimulus-response education, of which more anon. Here we only wish to indicate the modifiability of the nervous system and its plasticity and its amenability to education (Woodburne pp. 7 ff.). We have said that the blood supply is one of the determinants of brain action. It is, in turn dependent on good food and fresh air. Physical exercise, change of activity and rest, prevent too much energy being used up and remove the waste matter. Hence it is apparent that the proper care of the nervous system is the beginning of all education and that to torture the body to secure exaltation of the spirit is only to follow an obsolete belief.

Sensation

Dumville: *Psychology Chap. 3.*
Fraser: *Psychology of Education pp. 50-59.*
Betts: *op·cit Chap. VI.*
Horne: *Principles Chap. VII.*
Dexter and Garlick: *Chap. IV and V.*

We shall take up the receptive aspect of mental life and start with sensations. Our knowledge of the world that surrounds us comes through the senses; and sensations therefore form the apt starting point for all mental activity. A sensation is the simplest psychical reaction against the nerve current caused by a physical stimulus. A man is asleep in a room. Somebody is knocking at the door. Sound waves are created and they reach the ear. But the man is not awake and so is not conscious of them. The repetition of the stimulus wakes up the man and he is dimly conscious. He may now be said to have a sensation of sound. If he refers the sound to the knocker; it is no longer a sensation but a perception.

Perhaps children have simple sensations. But adults seldom have, their sensations being combined with either perceptions or memory images. In a sensation there is the physical stimulus, a physiological factor in that the stimulus is carried to the appropriate brain area by the nerves, and the psychical factor of the brain's reaction.

Sensations connected with particular sense organs such as the eye or the ear are known as the special sensations: those not so connected are spoken of as the general or organic sensations. The organic sensations are three in number :—those connected with the digestive system such as hunger, repletion ; those connected with the respiratory system as stifling, exhilaration ; those connected with the muscles as fitness, fatigue. They are organic because they are connected with the organism as a whole. They begin in one place and diffuse all over. They are not easily distinguished one from the other. They are important as regards our pains and pleasures. They are all-absorbing at times and specially so during infancy but becomes less and less important as we grow up. They give us no knowledge of the world outside ; but only of that inside. They are subjective states and not objective aspects. They are servants of the body rather than of the mind, and hence they are not very important for our study.

The special sensations are usually spoken of as five in number: sight, hearing, touch, taste and smell. Taste and smell are really akin to organic sensations, the other three to the intellect, and so are more important. But psychologists have discovered that the senses are not limited to five. The sense of touch may be divided into those of pressure, heat and cold. They also distinguish a separate sense of balance located in an organ near the ear. Sensation of the position and movement of parts of our body are also distinguished under the name of the kinaesthetic sensations These tell us of the nature of the reactions we have made and are of great importance in education. Thus if we close our eyes, we are still able to say what kind of movement our arm is making, and we are able to say in what position our arm is at any moment. In passive movement, when our arm is moved by others, we have a sense as to how it is being moved. These three types of awareness, of position, of active and passive movement, are brought to consciousness by a specialised set of nerves, situated for the most part in the joints and the sinews, and is called the kinaesthetic sense. When the child reacts to a sensation it

involves some movement and the memory of these movements is stored up as images which serve as guides for the future. It is one of the most important educative media in adaptive activities and will be treated under motor education.

Education must begin with the senses. The necessity for sense-training can be demonstrated negatively by the case of people in whom certain sense organs are either absent or defective. Where a person is blind education is impossible except, by special methods. In case of squinting and blindness in one eye, the subject is unable to perceive depth or relative distance, and they lead to psychic blindness and error in judging moving objects. Colour blindness incapacitates a student for Chemistry. Partially deaf and shortsighted children are generally considered stupid but they are not and should be seated in the front benches. In all these cases attention has perforce to be directed to the sense organs. Again the child of six observes everything in an inferior way. His perceptions of distance, time, form and rhythm, are defective. Children can have no conception of time beyond three weeks and one hundred miles mean very little to their consciousness. The perception of small differences is inaccurate and complex impressions are perceived in fragments. It is a pedagogic fault to presume that children's perceptions and their sense-contents of words, are the same as ours. They have therefore to be educated.

Our senses should be made as receptive and efficient as possible since they are the only means by which we realise the world without us. All intellectual processes are only engaged in the interpretation and elaboration of the material furnished by the stimulation of the sense organs. The greater the variety and wealth of our sense experience the broader and richer our mental life. Accurate sense perceptions are the best and the only basis for accurate reasoning. The mind can erect a substantial intellectual edifice only on the basis of sense-experience. There is nothing in the mind not previously in the senses. Education of the senses creates habits of observation, alertness and wideawakeness. It introduces to the Natural Sciences and creates a love for the beautiful; for beauty makes a sensible appeal and no one can appreciate it who has dulled senses. All these considerations show that the senses have to be trained. (Horne : *Principles* Chap. 7)

Some instructions can be given to guide sense training. Childhood is the period when the senses rule life, and hence

it is also the period of sense training. Contact with objects is a prime necessity in sense training. Therefore children's education should be concrete. They should be allowed to see, touch, handle, taste and smell actual objects. Too many teachers teach words and not things. Now, words are past percepts and cannot teach a totally new one. Words cannot tell a blind man what colour is. Hence in every case words should be newly constructed from things. Things before words. Mother Nature does not explain what is meant by light and darkness, hard and soft, noise and quiet. She presents her varied phenomena and through them the child has to acquire its ideas. Information concerning the external world can be obtained by (1) direct sensory contact (2) by pictures and other symbolic representations and (3) through the medium of language. Words are like pictures in that they represent the objects; but they are unlike pictures in that they are not like the objects and can therefore be only truly representative, in so far as they have been connected with the appropriate objects in the past experiences of the people using them. Even pictures and other symbolic representations, presuppose the proper experiences in the pupils to interpret them. Therefore some kind of concrete contact with things is necessary even to make language intelligible. This is the justification for the object method of teaching. The school should have certain sensory apparatus, cases of minerals, plants, animals, curios, weights, measures, planes, scales and solids. There are certain agencies in the curriculum such as the kindergarten, object lessons, nature-study, the sciences, manual training and drawing which should be properly used for sense training and even the abstract subjects should be taught on a sense-basis. Appeal to all the senses. Write on the board, speak it, act and thus knock at the doors of as many senses as possible to gain entry into the mind.

The senses should be trained in the order of their development. Touch develops earlier than the rest. The baby clutches before it can recognise its mother's face. Then sight develops. First discrimination of light from darkness, then the distinguishing of objects and finally perception of solidity and distance. As regards hearing which develops next, the first distinction is between loud and little or no noises and later, recognition of specific sounds such as the mother's. To follow this order would be following nature. The senses should be developed in proportion to their intellectual importance. Sight and touch are the most important. The optic nerve is much bigger than all the

other nerves. Boys remember what they see much better than what they hear, and what they see should be corrected by what they feel. The child himself should be made an agent in the training. That is, he should be made to bring his senses to play in response to a felt need. He must react on the sensation, if he should be educated. Thus it is erroneous to hang up in the child's nursery paper of many colours in the hope of giving him the colour perception. So too pictures and maps on the walls in the geography room need not necessarily educate. But if a child is asked to weave coloured mats or to match colours, it is having perception.

Some false opinions have been entertained as regards sense training. Some think sense training is for acuity. This is wrong. Most of our sensations are developed to an acuity or sharpness of discrimination in early life, far in advance of the requirements of every day usage. With a child of school age the acuity of the senses is not capable of further development by training and thus whatever else is meant by sense-training, it cannot refer to an actual increase in acuity by training. The efficiency of the sense organs is the work of nature and if nature has not done it, not the teacher but the oculist or the otologist must assist her. Even these are almost helpless. The teacher naturally can do something to keep the sense organs in a state of health but he cannot improve on what has been given by nature. What is meant, however, is educating the mind to the best use of the sense organs. One whose senses have been trained, has attentive appreciation of sense reports, and understands their significance. Thus a naturalist in a forest has the same number of sense stimuli as ourselves; but he attends to more than we do and understands them better. We go blindly but he lives among his interests.

Again sense training might easily be prolonged. After a time the work of the senses becomes automatic. A lesson in sense training may be valuable for a child of five and not for one of eight. Thus object lessons may be suitable for lower classes but not in the high school. Besides sense training may be too exclusive. Teachers are under the impression that the child is solely under the influence of the senses. They make him observe and gather percepts without showing them the universal under the particular. Children have some rudimentary powers of generalisation and reasoning. Therefore along with sense training, some kind of exercise should also be given to the higher mental

powers. Finally sense training should not be over specialised. It is one thing to make our sense organs efficient receivers ; it is quite another to make them like those of the artist or the musician.

The Montessori Method

Boyd: From Locke to Montessori.

Perhaps the most famous application of the principles of sense-training is in the Montessori method. Dr. Maria Montessori was born in Italy, in 1870 during a time of rapid political change in which she took full part being the first lady in Italy to take a doctor's degree. Her first appointment brought her into contact with feeble-minded children, and so she was led to study the methods of Seguin in the treatment of such children. She came to the conclusion, that they stood more in need of education than of medical treatment. She advocated this view before a conference of teachers and soon after founded a school for defectives and studied the methods of Lombroso and Sergi and believed that social anthropology would revolutionise education. She was led to apply the methods she had devised for the education of the mentally retarded, to the normal children because in a public examination the former taught by her, did much better than normal children taught in the ordinary schools. She thought that this was because her methods helped psychic development; while the ordinary school education had a stultifying effect. Struck with the possibilities of her discovery she devoted herself completely to the study of Experimental Psychology and Social Anthropology, the result of which she was able to put to the practice and to test, in her capacity as superintendent to the children's houses created by a new housing scheme.

Dr. Montessori is for ever protesting that her methods have not been dictated by a philosophy of life; but by concrete observation of child development unbiassed by preconceived notions as to its nature or end. This makes her system lack coherence and to appear as having been borrowed from different sources. There are at least three corner stones to her system, and these are the development of the muscles, sense training and freedom. The first has been due to the influence of Seguin, the second to her studies in Experimental Psychology, the third to her observation of child life. For the development of the muscles, she has devised a number of physical exercises ; for the training of the senses she has invented the Didactic Apparatus;

and the idea of freedom has important effect on her methods. In her own words her aim is to lead the child as it were by the hand, from the education of the muscular system to that of the nervous system and of the senses, from the education of the senses, to general notions, from general notions to abstract thought, from abstract thought to morality.

Freedom in education is partly due to political and partly to biological, influences. Our education should fit us for the life of a free citizen and so itself should be free. Besides each individual is a unique expression of the vital force and grows by an inner impulse, which must therefore be given complete freedom to act. Dr. Montessori gave a positive content to freedom by identifying it with independence. No one can be free who is not independent. The educational implications of this conception of freedom are two fold-scope should be given for spontaneous activity and the child should be trained to be independent of other people's services. In accordance with the former principle, the forced immobility, cramped attitude, and externally imposed discipline have been done away with. There is no class instruction and there is no teacher, only a directress who is more an observer than a teacher. Each goes his own pace, and takes his own time. There is no compulsion to study the same things in the same way, at the same time. The directress provides the material gives the guidance and for the rest everything is auto education If a child fails to learn a thing, he is not punished, it only means he has not reached the stage and so is led up to it by simpler exercises. This does not mean that there is no ordered progression, but only that the impulse must come from within. There are no fixed seats at which the pupils should sit throughout the period. The furniture is light enough to be moved by the pupils and free movement is permitted. Silence and discipline are not imposed from outside; but are self-imposed and self-learnt. The other aspect of freedom imposes on the school a number of occupations. The children are taught to dress themselves, to dust and to sweep the room, to set and serve the lunch, to do their own toilet, to keep their room tidy, to cultivate the garden, to keep plants and animals and to make vases and bricks. The social duties of silence, courtesy and graceful movements are also taught by appropriate exercises.

The training to the senses is imparted by the didactic apparatus. The senses dawn in the child between 3 and 7 and the educator of the period can leave lasting influences behind. The aim of the training is the refinement of the differential perception of stimuli by repeated exercises. The

procedure is, first sensory discrimination, then fixing it in language, then understanding. Thus the pupil is told: "This is red," then "Give me the red," and finally "What is this?" showing the red. She says that sense education should be auto education since the pupils' senses can be educated only by their exercise. The didactic appartus is therefore self-correcting. Thus the block of wood with ten holes for ten different cubes has only one way of being correctly fitted. Again she lays it down that the senses should be trained in isolation. Vision overshadows all the other senses. The blind Laura Bridgman, has so developed touch that she can tell a person met a year before by the feel of the hand. Hence blindfold exercises should be given. Training should begin with large and sharply contrasted differences and then descend to minute distinctions. The apparatus gives training for all the senses except taste and smell. The first stage gives the pupil ideas of dimensions, height, thickness, and size by varying the diameter and height of cylinders. The great stair gives them ideas of larger and smaller, and of thinner and thicker. Then follow thermic and tactile stimuli. The hand is dipped into cold, lukewarm and hot water. Tablets consisting of alternate strips of smooth paper and sand paper are touched. Also the colour sense is exercised. During the third stage the child is asked to distinguish between gradations of the various sensations with which he is already familiar e. g., touch and the thermic. Then the training of the sense of hearing and weight is begun. Hearing could not be self-educated and so gradations of noise are provided by boxes filled with sand and pebbles and by a series of whistles. The children are asked to listen to the buzzing of flies. The weight sense is trained by wooden tablets of different weights. The sense of form is cultivated by many geometrical figures which are to be fitted into cardboard. During the fourth stage the ear is attuned to music, a series of 13 bells with different sounds being used. The earlier exercises are then repeated in the form of games. Dr. Montessori uses such methods in teaching reading and writing which she begins rather early and teaches the second first.

Perception.

Fraser: *Psychology and Education pp*: *70-83*
Betts: *The Mind and its Education Chap. VII.*
Horne: *Psychological Principles Chap. VIII.*
Dexter and Garlick: *Psychology Chap. V.*
Dumville: *Fundamentals Chap. V.*

Perception is the reference of sensation outwards to some object. A person is asleep in a room. Someone is knocking at the door. The nerves of the ear carry the vibration to the brain and yet the brain does not react. The psychological factor is absent and so there is no sensation of noise. But supposing these stimuli rouse the mind, it differentiates them from other stimuli and there is a sensation of noise. If the mind becomes more active and is able to identify the noise as a knocking on the door by its memory of such former experiences, it refers the sensation outwards and so gives rise to a perception. A perception thus consists of two parts—the discrimination and identification of sense-impressions, the *prehensive* part, and conjunction with past memory images and reference to an outside object, the apprehensive part. Hence preception has been defined as sensation plus thought, involving both presentative and representative processes, what is presented being interpreted by the intellect.

The true nature of perception is only understood by contrasting it with sensation. Our example shows where sensation pure and simple ends and perception begins. Sensation is a passive state, a kind of feeling; perception is an active state, knowledge giving and so akin to the intellect. Sensation is a simple state having only presentative elements and is difficult to recall; perception is a complex state having representative elements also and can be easily recalled. A sensation has only sensory material, a percept memory images, ideas and meanings also.

Some differences have been noted between the perception of children and that of adults. We have said that a perception consists of certain actual sensations and some memory images. The adult can distinguish between the two, but the child cannot, and he looks upon the images as actually existing. This is the source of "children's lies." Thus a child was rowed in a boat over a lake. When he went home he told his mother that he had put his toe over board and that it was bitten by a huge fish which he hauled over into the boat where it was eaten by the boat-men. This was not true. The journey was actual, the rest was supplied from his memory of angling (Read Jones: *Principles* p. 225). If the boy is reprimanded his imagination may be repressed. The proper way of correction is by enabling him to distinguish what is present from what is absent. Secondly children's percepts are not clear cut; and growth does not mean growth in numbers, but an increasing distinction and classification of a vague and undifferentiated mass. This is seen in children's vocabulary. To the child all men are "papa." If shown

a crocus, all flowers thereafter will be called crocuses. Later all small flowers will be given that name, or all those growing near the ground. It is only increasing experience with all kinds of flowers, limits crocus to its legitimate sphere. Thirdly, children's experiences even of the commonest things are of the poorest. That a boy knows the name of a thing is no guarantee that he knows anything much about it. Therefore the teacher is less likely to err if he presumes ignorance, than if he presumes knowledge. So we should fill up their knowledge and object lessons are used for the purpose. Fourthly, the child's perception is in pieces, as has been found out by experimenting with pictures. A picture of a drawing room for example, shown to the smallest class elicits *enumeration* of the things inside, to higher classes brings *description* and to the highest *interpretation* by relation. Thus the child is only slowly learning to synthetise. Fifthly, children's perception of space and time is deficient. The perception of space is acquired by our movement in it and grows with our growing movements. Other aspects such as size, dimension and form are taught by the Montessori apparatus. Direction and distance have to be taught in Geography. The perception of time is deficient – day, with children is not a period but only opposed to night. If you ask a boy whether he would have a thing he very much wants this week or the next, he will say the next. Children are unable to date anything beyond six months. Hence the futility of teaching them about centuries.

Some principles of perceptual learning may be formulated. The child's mind is a "big, booming, buzzing confusion " Everything is vague at first, out of which the mind selects one thing, which is used to describe many experiences. Thus out of the undifferentiated mass of humanity the child calls some one papa. But such a percept leads to reaction and individual distinctions come to be differentiated. Thus children do not call all women "Mamma." Therefore the second stage is differentiation or the perception of differences. When differences are noted the number of percepts grow rapidly and so some kind of classification is necessary which is done by the perception of differences among similarities, and similarities among differences. In this way percepts become clear cut and sharply defined. The process may be illustrated from the way in which we pick out oranges from a basket of mixed fruit. First you *select* all the yellow coloured fruit. Looking for differences, you reject the lemons. The tangerines may give some trouble. But you smell, taste and peer and accept them in the end as similar. Thus our percepts of each become distinct. (Burnett *loc.*

cit. pp. 61—63) Again perception shows an increasing synthesis and abstaction. After studying different colours. we are able to abstract the idea colour. This is the very great difficulty of little children, as regards Mathematics.

Observation.

Adams : Herbartian Psychology Chap. VI.
Glover : Know your own mind Chap. XII.
Dumville : Fundamentals of Psychology Chap: 5.
Welton : Psychology of Education Chap. IX.
,, : Logical Basis of Education Chap. VI.
Dexter and Garlick : Psychology Chap.. VI.

To observe is to look at a thing closely, to take careful note of its several parts or details. This is done by a series of connected acts of attention and so it is called regulated perception. It is the prolonged perception which the attention directs towards a determined object. Observation has been often mistaken for visual observation ; but it includes not only attention to sights ; but also to sounds, touches, smells and tastes. In short observation is the testimony of the senses.

Observation is very important in education. We deal with facts ; and observation is the only way of getting at them. Every statement of facts rests on observation, directly or indirectly as when we learn from someone's report There is the mind within and the great world outside, and it is the teacher's task to bring the two together, by shovelling as many of these outside facts into the mind. The great shovel for this purpose is known as observation. Observation is thing learning and as such is the antithesis of book learning which is responsible for our preference of clerical as opposed to manual occupations and for town life as opposed to country life. Another use of observation lies in making our perceptions more complete. The testimony of the senses is not infallible as is shown by every case of illusion. Thus the moon at its rising and setting appears much larger, than when high up in the sky. This is erroneous perception as its diameter always remains the same.

There is no faculty of observation which can be trained and yet it is possible to give more ability for observing by training even though it may be only in specific fields. Dr. Adams speaks of a class which he had trained to note as much in five seconds, as an untrained adult will take two minutes to note. Three kinds of methods are used for such training. The first is the Correction Method. A picture is shown and when it is taken away the pupils are asked what it contained. Then it is shown again and their mistakes and omissions

pointed out. Then other pictures are shown and the same procedure followed. The second is called the "Naming Method." Here the technique of describing a picture is given to the class, such as colours, sizes, positions. The third is called the Score-Interest Method in which the children are given an interest in doing well, marks being awarded for good performance. But this kind of observation of all and sundry is not the best type. Observation means a careful selection, concentration of attention on certain things ignoring everything else. On what attention is fixed will be decided by the purpose in hand. Thus a detective's examination of a room where a murder has been committed is not of the *omnium gatherum* sort; but only relevant facts are selected and noted.

Observation involves three different factors, observation pure and simple, inference and knowledge. There is no good in trying to train the first independently of the rest. It is very difficult to mark where observation ends and inference begins. Thus in one of the Sherlock Holmes stories, the great detective tells Dr. Watson, "Observation tells me you had been to the Wigmore Post Office.' What he observed was not his entry to the Post Office, but a piece of red mould in his shoe which stuck there from the road in front of the Post Office dug up for repair. So his going into the Post Office was really inferred. Knowledge also is an indispensable factor in observation and he observes well who brings much pertinent previous knowledge to bear on the subject. Thus Dr. Bell of Edinburgh the prototype of Sherlock-Holmes once told his class that a perfect stranger who had just then entered the room was a pensioned officer lately serving in a certain island of the West Indies. He was able to arrive at this remarkable deduction by observing the marks on him of the bite of a certain insect, which is found only in that island. No amount of mere observation will tell a person this, unless supplemented by knowledge. In one of "Sapper's" stories of Ronald Standish the only clue left by a murderer was the saying "two bells on the 2nd dog" which had one meaning to the ordinary person but to the detective who knew something of nautical life it meant 7 p. m. and proved a sure trail to the criminal. During his first visit to Wales, Darwin did not observe any of the abundant signs of glaciation. He made a second visit to that country having in the meanwhile read Lyell's *Geology* and then the marks of glaciation such as perched blocks, scratched and rounded rocks and pot-holes literally forced themselves on his attention (Sandiford *Op. Cit.* p. 218 . Hence to cultivate observation we must cultivate wide general knowlege to correspond.

The ordinary subjects of the school curriculum, could be so taught as to train observation. Learning by doing should be emphasised. Doing corrects the imperfections of perceptions. Thus Welton (p. 305) speaks of two classes in Drawing, one taught by the system of lines and curves and the other by drawing objects at sight, both of which were asked to draw a lady standing before them. The production of the first was not different from that of savages or of children who had never been to school; while that of the second was more or less a likeness of the original. This shows that it had been falsely perceived in the first case while in the second the drawing had improved the perception making it more exact. Object lessons promote observation, in that they permit of a few things being properly examined. Attention should be directed to the objects as wholes and contrasted with better known things. Salient features must be noted first and then less important ones The child should describe what he observes as it is the expression part which clarifies his ideas. The teacher should not describe the object, turning to the specimen, only to confirm his observations He should allow the object to speak for itself. Elementary Science may be taught so as to develop observation if the Text-book method is not used. The experiment or the specimen should come before the formal lesson and the boy should go out to explore mother nature with a note book (Dexter and Garlick pp 92-95). Geography too, should begin with one's physical neighbourhood and then proceed to industry and commerce and then only to the study of books. Books, pictures and models should be plentifully used. Things afar should be illustrated by things near. Every thing should be taught in a concrete manner. Grammar also will develop observation if pupils are allowed to frame rules from the examples and to apply them to other cases. History should start with the pupil's environment, and should make use of coins, an election, the policeman, the town hall, the market place or a ceremonial function. This would open his eyes to his social surroundings.

Apperception

Adams: Herbartian Psychology pp. 64-76.
Dexter and Garlick: Psychology in the Classroom Chap. 12.
Munsterburg: Psychology Chap. 15.
Bagley: Educative Process Chaps. 4 & 5.
James: Talks 14. Horne: Principles Chap. 14.
Glover: Know your own mind pp. 86-119
Ruediger: Principles pp. 281-98.

We must distinguish between perception and apperception because from the bare definition it would be difficult to

find much distinction between the two. We have said that perception is due partly to sensation, partly to thought. To the presentative elements, the mind adds representative elements ; to actual objects revived images ; to what is obtained from without, something from within. Perception is caused by the action of object on mind, and the reaction of mind on object Thus our percept of an apple consists of actual sensations such as colour, form, as well as revived ideas of taste, smell, size. Apperception as ordinarily defined, is nothing more. Perception is the process by which present impressions are assimilated by previous experience held in the mind as concepts. Apperception also, is only present impressions as interpreted by knowledge previously present in the mind. Psychologically therefore, the two words mean the same, but logically a slight distinction can be made. When apperception is spoken of, stress is laid on the interpretive or assimilative side of the perceptive process, to the comparative neglect of the sensation side Apperception is process and not a mental result like sensation. Apperception is the mental assimilation of a sensation resulting in a perception. The distinction, it is possible to make *not* merely in the abstract, but in practice. Thus in the case of absolutely new things, the perception is there but there is no apperception because there is no previous knowledge. A scientist might devote himself to the observation of facts and then proceed to interpret them. This interpretation or reading of meaning into sense impressions, is primarily carried on through concepts stored in the mind and when we speak of apperception we mean the pedagogy of the concept, rather than the pedagogy of the percept as that would include sensation as well The doctrine of apperception therefore teaches us that a child can acquire more experiences only on the basis of the old which are stored in the mind. Perception refers to the physical side. Apperception to the intellectual side. In perception the sensory or the objective data predominate; in apperception, the subjective data. When we see familiar things, we have only perception, as the interpretative part is almost a habit. But when we see new things, we ransack our minds for data to help us recognise it.

If previous knowledge is necessary for the acquisition of more, how does knowledge get started at all ? We should look for the answer in the origin of knowledge in the child mind ? The infant is born with a great capacity for reaction, through its instincts. He is an active, moving, squirming organism, capable of entering into all kinds of relations with his environment and of reacting

to it In this manner the child automatically acquires certain experiences which later on help it to interpret further sensations. In the beginning, the sensations which the adult would interpret as "nurse" or "mother" have no meaning for the child. Gradually, this undifferentiated mass of sensation and feeling is resolved into a number of meaningful units. Thus the sensations which the child receives from a feeding bottle are interpreted by previous experience and the bottle becomes meaningful and is apperceived as capable of satisfying hunger. The synthesis of chaotic elements into meaningful units is achieved by certain of these facts standing in a definite relation to some need of the organism This is why in children the meanings of many words are associated with their use. Thus a clock is to see the time in, a chair is to sit on, a fork is to eat with. From this the lesson is plain that even in language lessons, the child should learn by doing. Primitive needs give rise to apperception of low degree, while acquired needs give rise to apperception of high degree. Thus a tea cup is apperceived low when interpreted as a missile, intermediate when thought of as enabling tea-drinkg, of very high degree when collected as an artistic piece of *bric a-brac.* Tendencies to reaction in this manner come to be grouped into larger systems and these exhaust the whole of a man's life. Thus a man has a business phase, a social phase, a family phase &c. It is one of the functions of education to build these apperceptive systems and to overlay those of low degree with those of high degree. We have said that apperception is due to previous experience stored in the mind as concepts. In modern Psychology the residue of previous experiences is spoken of as engrams and apperception masses are said to be due to the endopsychic cohesion of these engrams and called more aptly "complexes" (See Ross: pp 48-49.)

In the pure field of education the principle of apperception is of great importance. It has been variously defined but the definition by James is the best He says that "it verily means nothing more than taking a thing into the mind." As such it is a result of the association of ideas. Every idea that enters the mind should find something to associate with either by similarity, contiguity, contrast, &c. Hence every new idea that enters the mind is drafted off, in some determinate direction or other and assimilated to some experience already present in the mind. Thus the new is joined to the old. We apperceive a thing with the help of our old stock of ideas, which may be called the apperceiving

mass. If a really primitive savage sees a motor car for the first time, he will call it a buffalo : because it runs like one. When the motor car first came to Travancore it was spoken of as the vehicle without bulls, later as the kerosine car, and finally as the automobile. That is, it was being apperceived in terms of contrast with existing vehicles. Nothing illustrates the truth of the principle better than the story of the four blind-men who went to see the elephant. The classic example is that of the child who called a potted fern a pot of green feathers, the sea as a big tank and the Zebra as a horse on which a striped blanket was spread. The principle of economy holds here. We are not prepared to make an extensive re-arrangement in our mental make up, to admit a new idea and so we assimilate it to the old. This unwillingness grows on us as we grow old and we become "fossils" or "old fogeys".

Our apperception depends upon our apperceiving ideas. The more of these we have the better is our cognition. "To him that hath it shall be given. We bring back from our travels according to what we carry ; more is given according as we already have ; we see what we have eyes to see ; we hear what we have ears to hear '. The child has a few ideas and so apperceives everything in terms of these. Thus the child who has come to know of "going to sleep" and "waking up" uses these for everything from hats and sticks to flowers and trees. The hat is asleep when laid by, and awake when put on. This is why again, a doctor sees more in a case of ordinary illness than we do ; and a student of Political Science, in current politics. Hence it is one of the duties of the teacher to supply the apperceiving mass where it is lacking.

As a result of apperception the new is modified. We never get an experience that is absolutely nondescript. It takes its character from the character of our own mind. Thus an eclipse gives rise to quite different results in the mind of an astronomer and in that of the savage. The same fact may be presented to different audiences, and each will assimilate it differently, just as milk given to monkeys, cats and dogs produces a different tissue in each case. Not only is the incoming experience modified, but the old also is changed. Thus a child brought up in a German home where all tables are square, thinks that a table should have four sides and corners. When he comes across round tables, his old ideas are correspondingly changed. A child brought up in England believes all people should be white and so when he sees

any one of the darker races, thinks he had been inside the coalhole. Apperception yields comprehension. We understand a thing properly only when we classify it and relate it to other things. Thus a rare specimen has no meaning for us until we know where it belongs. Apperception results in interest. That which gains our interest is the new in the old and the old in the new. The absolutely new makes no appeal to us and the absolutely old wearies us. Apperception gives unity to our knowledge by welding it together. This is the outstanding feature of the period of reconstruction. Finally apperception makes the pupil an agent in the acquisition of knowledge. We may spend any amount of time shouting information at our pupils; but unless they relate it to what they know already, no good results.

The principle of apperception is of fundamental importance in teaching. The teacher must study his pupils. Since each pupil apperceives according to his previous knowledge, the first duty of the teacher is to study the individual minds, so that he might present things in a manner best suited to that pupil. No teaching is possible where there is nothing common with what is presented and the pupil's mind. Not only should we start with this common factor but should utilise it to the full. This is the significance of the steps Preparation and Recapitulation. In the former we bring to the forefront of attention the apperceiving mass and make it explicit; in the latter we prepare for the next day's lesson by making the present day's vivid. Again all new matter should be presented in terms of the old knowledge, so that it can easily be assimilated by what is already in the mind. Thus when Jesus Christ chose his disciples from fisherfolk to spread his gospel, he told them, that they were to be "fishers of men," a way of putting the matter which they would understand better than if he had said "to convert men". Where the apperceptive material is laking the teacher should supply them. This is the root of explanation. The experience of the pupil should also be broadened by observational tramps, pictures and stories. The necessity for apperception imposes upon us the necessity for slow haste. We must give time for the new to take its place with the old. If things are heaped up in a hurry there is no time for the pupil to think and assign them their place with what he already knows. Hence we should proceed in leisurely fashion : and at the same time finish the lessons much in advance of the examination. If they are crowded into the last few days, the matter makes no connection with what is already in the mind and is not assimilated.

Memory.

Watt: The Economy and Training of Memory.
Edridge-Green: Memory and its cultivation.
James: Talks XII. Burnett: Essentials Chap. 3.
Adams: Students' Guide Chap. 3.
Fraser: Op. Cit. Chap. 6 Horne: Op. Cit. Chap. 10.
Jones: Principles pp 196-216. Ruediger: Op Cit. Chap. 16:
Bagley: Educative Process Chap. XI.
Strayer and Norsworthy: How to teach Chap. 5.
Strong: Introductory Psychology pp. 70-120.
Sandiford: Op. Cit. Chap. 12.

When the mind acts in such a way that it records, retains and reproduces, ideas, gained by its own activity, it is said to perform an act of memory. So there are three well marked stages—apprehension or the fixing in memory, retention, or the keeping in memory, and re-production or the bringing back to memory. Images are the means by which experiences are stored in the mind and so we must understand their general nature. When we try to remember what an orange was like, first we get a notion of it as something yellow, round in shape, with the rind pitted with holes, then the feel, the smell and the taste come to our mind. Thus we get the idea orange. We shall never confuse this with the real orange. It is due to the re-collection of many oranges that we have seen before. This "idea orange" is called an image, a mental image, or a representative image. Its nature is better understood when contrasted with a percept. A percept is caused by something real while an image is independent of external objects. A percept is independent of the will, while the image is dependent on it and is summoned to consciousness by its exercise. A percept is presentative while the idea is largely representative. The gulf between percept and image is bridged by a number of intermediary mental processes. Thus the hand tingles some time after catching a ball. This is not a percept because the physical stimulus is not there, and it is not an image because it is due to such a stimulus and so it is called an after-percept. Again a popular song that we had heard, keeps coming back to our minds. It is not an after-percept because it is not due to the physical stimulus and it is not a pure image because it comes without an effort of the will. Hence it is spoken of as a temporary mental image. Therefore we may define an image as a revived percept or group of percepts and it is this that generally functions in the memory processes.

So much, for the mental machinery of memory processes (Read Betts: *Op. Cit.* Chap. 8). The factors which condition

the memory process are two — power of retention or native retentiveness, and the number and organisation of associations. The first condition involves the assumption that all mental activity is conditioned by nervous activity. Therefore the quality of the memory will differ with the quality of the nervous structure and must perforce vary with different individuals. This is at the bottom of the magnificient memory of men like Scott, Macaulay, Goethe, Gladstone. Their memory is determined by the character of their nervous systems. Some memories are wax to receive and marble to retain. There are memories which are so wonderful, that they must be deemed monstrous. Thus Dr. Leyden can repeat a whole Act of Parliament after reading it once, Seneca can repeat a list of 1000 words in the order in which they were uttered, after hearing them repeated once (see Edridge-Green Chap. VI). The case of "Datas", the memory man is well known. James mentions a Pennsylvania farmer, almost blind who could re call the day of the week for each date of over forty years, the nature of the weather and his occupation on each day. Fraser mentions a man who can reproduce after hearing once, a number of fifty-two digits. Such memories are born not made. The generality of mankind are born into the world with a memory of a certain degree of retentiveness and power of re-call, and with that they must go through life making the best use of it. One of the ways of doing this, is, by seeing to good physical health. To the extent that good blood, sleep, exercise &c. put the nervous system in better tone, to that extent the retentive power present is put in better working order. Over-work, over-feeding, over-drinking, over-indulgence of every kind, all have a marked effect on the brute memory. We despise our heritage of retentiveness, when we solicit ill-health by poor food, overwork, lack of exercise, bad air, improper clothing and anxiety. Therefore avoid brain fag of all kinds.

The next two factors in a good memory, association and organisation give the lie to certain conceptions regarding it. It was contended in olden days that we remembered in virtue of a faculty of memory. To explain memory by a faculty, is to argue in a circle and to say that we remember because we remember. It doesn't go behind the fact and lift the veil ; it is no explanation. Besides if we remember, because of a faculty of memory we should be able to do so when we say to it, "remember, recollect." We do not remember unless we are told what to remember. Without the cue we could remember nothing. If we had a faculty of memory we should remember most when there was need for it. There would be,

no use for repetition, frequency &c., if memory was a gift from the gods. Old things should be remembered equally with new things. But if we remembered because of our associations, we could easily understand why new and recent things should be remembered better. Therefore the faculty of memory is really another aspect of the association of ideas. We remember because of our associations. Our mental constitution is that of a large number of groups of associated ideas which hang together like bees in a hive or grapes on a stem. When one thing in the group is thought of, it brings to memory other things associated. Each idea forms a cue and a clue to get at the other. It forms a hook to fish out other ideas from obliviscence. The secret of a good memory is thus the power of forming diverse, and multiple associations with every fact. One who thinks over his experi nce and weaves them into conscious relations, has the best chance of remembering them. Thus over and above our native retentiveness it is our associations that make us remember (Betts: chaps. 10 & 11). Instances that prove the part played by each are numerous. Often we meet persons whom we feel we know but could not place until they remind us of some incident when we came in contact with them and then recollection comes in a flood. That is, our native retentiveness was at fault, but our associations came to the rescue. One day a servant absolutely denied having given a letter into the hands of a gentleman but when confronted with the person himself, immediately remembered having done so. Such considerations made James say that we have no general memory but only memories for particular things, in so far as such things are formed into associated groups in our minds. We have a memory for history facts, another for science facts, another for business facts and so on. That is how a man after giving up the Second Form because he has not memory enough for the work, takes up shop-keeping and can reel off prices of innumerable articles. A college athelete who may be unable to remember the facts in his academic work, is still able to give glibly interminable football fixtures. La Rue mentions the case of a mathematician who could repeat over fifty figures in order, after they had been read off to him and yet could not give ten letters in the same way. Even such great men as Darwin and Frazer may conceivably have had very little memory in other walks of life. When you have a thesis like evolution to support, facts would cling to it with utmost readiness. Gibbon is said to have joined school, with an erudition that would have done credit to a don and an amount of ignorance that would have made a schoolboy blush.

A memory is so far useful, that it remembers past experiences to serve present purposes. Therefore one of the marks of a good memory is that it should re-call with ease. There are certain factors which go to make for efficient recall. These are the conditions under which the experience had been acquired They are five in number, the Recency, Frèquency, Primacy, Vividness and Associability of the experience. The part played by these can be easily proved by an experiment. Read to your class a list of 13 or 14 words, most of which are about equally interesting, but one very interesting. epeat one of the words two or three times. You will discover that the first word, the last word, the most repeated word, and the most interesting word are the best remembered (Jones p. 196). That is if there are about thirty pupils, these are the words that are remembered by the largest number. The first three, Recency, Primacy and Frequency are temporal aspects of experience, while the fourth Vividness refers to its quality. The last, Associability or organisation is the most important. *Recency.* The more recent the experience the more easily is it re called, is a matter of common experience. It is negatively important in teaching, as condemning cramming. It means much to a student to refresh his memory just before an examination. This is recency used to good purpose. It is used to bad purpose, if it is brought forward to support cramming. Cramming seeks to stamp things in by intense application immediately before the ordeal. Matter so learnt can form only a few associations in the mind. It is only that which is recurring in different contexts, on different days, read, recited, referred to again and again, that weaves itself into the very texture of the brain. So cramming subverts the true purpose of education and makes the examination a bad test of efficiency. It would be the best, as the most economical method, if it led to the results desired ; but it does not. As teachers, the law of recency is significant to us, because it shows the value of revising at the close of a lesson, the points which you desire to emphasise and which will form the point of departure for the next day's lesson. *Primacy* or *Novelty*. Everybody acknowledges the power of "first impressions." We love at first sight and first impressions are always lasting. The new thing catches the attention. Betts mentions the case of a German who being naturalised in an English speaking country, in course of time became unable to carry on conversation in his mother-tongue. But during his last illness he forgot his English completely and reverted in speech to his native German. Old men who have forgotten recent things, retain a vivid memory of their childhood days.

To the teacher it suggests that the new thing attracts and that he should make a pupil's new introduction to a subject absolutely pleasant and enjoyable. The hatred and dislike entertained by some people for certain subjects is because some unpleasant experience is connected with it. *Vividness* is the intensity of the sensation. In teaching it means brightness, emphasis, lucidity in contrast with dulness, monotony, obscurity. A deep impression is lasting. We are able to re-call with great precision all the details of a striking accident. This does not mean that we should use spectacular methods in our teaching. But at all times the teacher's manner should be alert, earnest and purposeful, his speech clear, incisive, emphatic, his definitions correct, his matter well-chosen, his illustrations apt or illuminating. Though spectacular methods are not to be employed, a deterrent punishment should be sufficiently vivid to inhibit the action in future. Children of the lower grades are absolutely at the mercy of their senses, and so we should appeal to the senses *Frequency*. Practice makes perfect and in teaching this saying could be put in the form, repetition is the mother of learning. It is most important in habit formation, and is not less important in higher studies. It is probably the greatest defect in the raw teacher that he does not sufficiently repeat (Colvin: *The Learning Process* pp 149-54). These four factors of efficient re-call function largely because of the plasticity of the nervous tissue and in relation to concrete material. But in learning we do not deal with experience as such, but with language which is symbolic and hence it is experience in a condensed form that we have to recollect. For this purpose the factor most useful is association or organisation. This is the grouping of judgments by their thought connections, which are woven by thinking. When once two things are related in thought, they are lodged permanently in the mind much more forcibly than repetition could do it.

Therefore Association transcends all others as a factor in efficient recall. There are two laws for the association of ideas—The Law of Similarity and the Law of Contiguity. Similar experiences tend to recall each other and similar ideas suggest one another. The mention of the word "blue" might suggest the blue sky, the blue flower, the melancholy of a person &c., in each one of which cases, the new idea suggested by the word is due to its similarity to the old. Witty, imaginative minds easily see the resemblance, and thus analogy forms the link in their mind connections. As a corrollary to this law, is the Law of Contrast, which says that strongly contrasted objects suggest one another. Thus

"hot" suggests 'cold', 'tall' "short", 'mountain' 'valley', 'vice' 'virtue'. This is due to the perception of difference and in the ultimate analysis, it is only another form of the Law of Similarity. Thus virtue and vice are alike, in being forms of human conduct, black and white are colours, day and night belong to the same category. Association by similarity is the mark of the highest mind, and in its best manifestations are to be found in the inventors, and the original thinkers. Ordinarily the associations in the mind are chiefly forged by contiguity. Things which were experienced together, become associated and tend to reall each other. The connection is chiefly one of time and place. Thus mention of William recalls William the Conqueror which in turn recalls Normandy. Kitchener recalls Khartoum. When we learn by successive iterations, it is chiefly through the law of contiguity that the ideas become associated in the mind. Thus A. B. C D. suggests E. F. G. H. Association by contiguity is not the best kind of association and often leads to dangerous results in teaching. The teacher who relies in contiguity for eliciting, wastes a great deal of time. In an object lesson on "Coffee," the teacher begins the introduction with the question, "what did you have for breakfast this morning?" He may have to ask many before "Coffee" is mentioned, or it may not be mentioned at all. Here the teacher relied on contiguity and therefore landed in an "Omnibus" question which admits of many correct answers, in so far as there were many other things for breakfast than coffee. If contiguity had to be exploited, it should be unmistakeably close. Thus the teacher might have asked "instead of tea what does your mother give you for breakfast at times?' The law of contiguity is also responsible for much tangential teaching. The teacher who rambles or says asides in the lessons, is thus carried away by some accidental relationship in place and time, from the real matter of the lesson and might never arrive at the desired conclusion. Such is the Flora Finching type. (Burnett p. 44 ff.)

Causality as a factor of Association is so very important, that it has been spoken of separately under the name of organisation. Ideas causally connected have two features which distinguish them from ideas which are connected by contiguity. These latter must exist contemporaneously; while in the former the cause must precede the effect. Secondly in contiguity association there is no compelling necessity in the association, but in cause and effect the one must needs follow the other. Thus causal connections are more extensive (independent of time and space) and are

more firm, and they play a great part in the training of the mind. That which distinguishes the scientific from the unscientific, the wise man from the fool is the capacity to make such causal associations. The capacity of organisation to revive experiences has been proved experimentally. Thus it has been found easier to learn by heart things which are sensibly connected than pure nonsense. (Bagley p. 174). To grasp the thought connections, is to carry the thing away in memory. This is why we insist more on rational teaching than on mere memoriter methods. Whether it is in Geography or in History or Science, it is customary to show the sequence of cause and effect and thus implant the fact in the mind. This leads us to believe that a Science being a rational system is a great mnemonic and labour-saving contrivance. Instead of carrying a large number of particular instances, it distils a law from them which shows the relationship among them and thus discards the lumber A philosophic system which would reconcile all knowledge must also contribute for mental economy. This would enable us to understand why thinking should form the real key to a good memory, as thinking is only another word for associating, or relating two or more ideas. For fixing facts in the mind pupils should be shown their causes and their effects. Instead of repetition, intelligent understanding should be brought about by thinking facts into relations. Where such thinking is lacking real memory is wanting, and the loosely jumbled facts fall out. If the teacher cannot do much for native retentiveness, he can do a great deal for associations and thus make for a good memory.

There are other ways of aiding memory in the shape of memory-training systems and mnemonics. These depend for their success upon artificial ways of grouping experiences to help recall. Memory systems are very popular nowadays. They start by making the pupil get up some definite framework, and arrange on the basis of this in a definite relation, all matters to be remembered. Where there is success, it is due to the fact, that to the natural endowment of the pupil, is added the efficiency caused by the systematiser. The very fact of concentrating upon a narrow field, brings with it easy recall. Besides, those who take to memory training, have the will to improve, which wins half the battle. Mnemonics also depend for their success on the organisation of associations. The principles of every mnemonic system, is to form some sort of association, usually accidental, with the thing to be remembered which is then fixed in consciousness by thought and attention. Thus in the learning

of dates and names which have no rational thought connection, the mnemonic tries to supply an artificial reason for association. No one will have difficulty in remembering the height of Pike's Peak as 12,365 feet, when it is associated with the number of months and days in the year. More complicated is the number alphabet or the figure alphabet, in which each digit is represented by a consonant. Thus 1 is t or d, 2, n &c. So that if you wish to remember the date for the founding of Harvard 1636, it comes to t, ch, m, ch, or "teach much". If you wish to remember the velocity of sound 1142 ft. per second, it is t, t, r, n, or "tight run" Here, of course, the defect is the great deal of scaffolding required for such a little amount of structure. The boy who could learn the key can easily learn the matter itself. Besides in the matter of dates at least, the historian's way of remembering them is better. He knows the concatenation of events and can easily place an event in its right setting. The help given by such devices is also illegitimate as they throw us back upon mere rote-learning and make us depend upon words instead of thoughts. (Adams : Students' Guide p. 76) But there are certain matters which the pupils cannot understand and yet have to memorise e.g., "thirty days hath September." Rhythm helps learning. If we have to learn the names of a ministry or a list of minerals, it is best to arrange them so as to produce a pleasant combination of sounds. It is also legitimate to use the initials as in "Vibgyor" for the colours of the rainbow; and "Cabal" for the ministry. To fix alternatives, the use of mnemonics is justifiable because the boy cannot be taught to choose between them by reason. Thus Julia Ward Howe and Harriet Beecher Stowe are often mistaken one for the other.

This brings us to the question of learning by heart. The old education laid undue stress on learning by heart: the new has unduly despised it. Montaigne said that to know by heart is not to know. This will be true if we make a distinction between learning by heart and learning by rote. Learning by heart means the assimilation of the matter so thoroughly that it becomes part and parcel of ourselves. The facts are remembered by the sequence of ideas as well as by the sequence of words. In the learning by rote the sequence of words alone is taken into account, and the sequence of ideas is disregarded. It is the parrot-like repetition of words with a view to commit them to the brute memory, without any thought of their meaning. It is customary for people to disparage *both*; but each has its own sphere, though neither of them is highly admirable, least of all learning by rote.

Whenever the form is of the very essence of anything, then learning by rote is both justifiable and desirable. A great part of the charm of a poem is the beauty of the actual expression. There is nothing more abject than the sight of a person, who, is always reminded of a quotation, which he cannot exactly recollect, but must eke out with gags and padding of his own. A poem should either be quoted verbatim or merely described. Between the years 6 and 10 the pupil's brain is very plastic and would absorb and retain facts easily. During this period he must be made to memorise matter which would prove of use to him later in life. What he learns he may not understand; but he will do so later on. The great point is to make the best use of the plastic period. There are certain things which have to be learnt by heart. Those things which have very little meaning in themselves such as dates in history, data in Geography and Grammar and spelling. Beautiful passages from literature which express high and ennobling thoughts in choice language should be learnt by heart. Formulæ in Mathematics and definitions which sum up our knowledge in convenient form and thus constitute apt tools, should be memorised. But is would be better if even these are not blindly acquired. Thus the rule may be learnt by observation of particular cases, and by deducing the rule out of these particular cases after classifying them. But there are other things which should not be learnt by heart, e. g. list of exceptions to a rule in Grammar, or list of geographical data such as imports and exports, capes, bays and gulfs.

Since learning by heart has its place, we, should consider the best methods of doing so. There are three ways of learning by heart — by repetition, by concentration, and by recall. Repetition depends upon frequency, concentration upon repetition with attention and in recall we go over the material as many times as we can and try to recall as much as possible, reinstating the thought connections. The last is the best because it combines the first two, is economical, as the learner can stop when he knows the lesson, provides for recall and so is sure, establishes good habits and works by association and organisation. There are two ways of using the material in learning by heart: the part or piecemeal method and the whole or complete method. The part method applied to a poem would consist in repeating a line over and over again until it is mastered and then proceeding to the next. This establishes the wrong connections viz., from the end to the beginning of the same line, and makes it very difficult to run on. It has been proved experimentally that the Whole Method (Woodburne Chap. VIII) is the

more economical. It forms the right connections, emphasises the complete thought and therefore saves time. It has some defects too. When the material is not of equal difficulty it would be wasting time to give equal attention to all parts of it. It discourages the learner for no appreciable progress might be made during the first few attempts. It is also difficult to use recall. Therefore a combination of the two methods would be advisable That is, if you have a long poem to memorise, do not learn it stanza by stanza; but resolve it into thought groups and after mastering each group attempt to take in the whole.

The time devoted to learning by heart may be used in a concentrated manner or in a distributed manner. It is found to be more helpful if we distribute the number of repetitions over a longer period than to use them all up at once. Distributed practice is better for retention than concentrated practice. If you can go over the piece twelve times it is better to take the repetitions in groups of 3 or 4 at a time; with pauses in between, than to take all the twelve at once. This is to allow for a factor called mental incubation. During the pauses, the mind seems to be learning by itself. This is what James means by saying, that "we learn to swim in winter and to skate in summer." When we have left off practising swimming the mind assimilates what had been learnt, as time is required to make anything part and parcel of our mental content. Dr. Ballard has proved by careful experimentation that after two days the maximum amount is remembered, less being remembered before and more being forgotten after. This is also shown in cases of amnesia, where when the patient who has suddenly lost his memory, begins to recover it, he remembers things not immediately before his seizure but those some time previous and then proceeds to remember things near the accident. However, if the doctrine that we learn to skate in summer, is true it may be taken as meaning that cessation of practice leads to improvement in learning. Where lack of practice strengthens associative bonds, the explanation does not lie in mental incubation but firstly in rest which brings out improvement masked by fatigue, secondly in the increase in the strength of bonds being masked by a decrease in readiness or a going stale and lastly in the weakening of undesirable bonds as a result of disuse. (Sandiford: *Op. Cit.* p. 240). Matter meant to be memorised should be so presented as to appeal to all the senses. Rhythm is an aid and so are certain mnemonic devices. Each pupil should be allowed to go his own pace and there should be periods

of rest. The teacher should explain the sense and show the thought connections in the passage.

There are different kinds of memory. *Immediate memory* holds for a short time. This is very useful for preachers, lecturers, lawyers and teachers. They should hold a large number of facts for a short time. *Permanent* memory holds for a long time. Children lack immediate memory; but have permanent memory which is the more valuable of the two. If we take the arrangement of the material, memories are divided into desultory, rote and logical. In a *desultory* memory, because of the great retentiveness facts stick even though there is very little arrangement among them. *Rote* memory is otherwise known as *Verbal* memory — the very words being reproduced. *Logical* or *Rational* memory does not reproduce the very words but gives the sense. It is a memory for meanings. Children have good rote and desultory memories but very little logical memory. Teachers, clerks, politicians and others require a good desultory memory. Rote memory is required for actors, singers and musicians. According to the rate of acquisition memories are either *quick or slow*. Quick come quick go, is not true. Those who learn quick have often the most tenacious memories. Facility in learning and tenacity in retention are positively correlated and a man's brute retentiveness is the final determinant of memory however much methods of memorising may be improved.

The forgotten still counts so that fewer repetitions are required to learn it afresh. Manual habits such as cycling and swimming are not so easily forgotten as language habits partly because they are based on native connections and are enormously overlearned. But language habits are artificial connections and are not easily overlearned. The losses in manual habits over periods of from 5 to 10 years are 50 to 90 per cent but the losses in language habits during the same period are cent per cent. Significant material such as poetry is longer retained than meaningless material such as nonsense syllables. Ebbinghaus found out that after 20 minutes 58 per cent of what was learnt was remembered, 44 per cent after one hour, 36 per cent after 9 hours, 34 per cent after one day, 28 per cent after two days, 25 per cent after six days and 21 per cent after thirty days. The major portion of what is forgotten is in the first 24 hours and the rest in 3 days. This is why we should confirm the material in the memory by review and repetition in the early stages, before it is completely forgotten. Ebbinghaus proved that the longer the interval before relearning, the smaller is the percentage of time saved in relearning. Disuse leads to deterioration and

so every lesson has to be revised at the end of the year or at least those which are likely to be important for the next year. The psycho-analysts have taught us that forgetting is no mere passive act. According to them, forgetting is a defence mechanism guarding the mind against the intrusion of experiences which would cause it pain or discomfort. We remember to cash cheques but forget to pay our bills. Darwin had to make a special note of observations that did not fit in with his theories. Pleasant experiences are remembered longer than unpleasant experiences. We need to cultivate the art of forgetting non-essentials, so that consciousness need not be burdened with the insignificant. As the child grows it must slough some of the unessential experiences. As Dr. Adams puts it, "true learning is really judicious forgetting."

Imagination.

Dexter and Garlick: Psychology Chap. IX.
Strayer and Norsworthy: How to Teach Chap VI.
Horne: Principles Chap. XI.
Woodburne: Human Nature and Education Chap. VIII.
Jones: Principles pp. 216-233.
Fraser: Psychology Chap. IV.

Imagination may be defined as the consciousness of objects not present to the senses. In perception there is presentation of the stimuli arousing the sensation; but in memory, the original stimuli are absent. Thus memory and imagination are both cases of ideal representations where previously experienced sensations are recalled as images. Therefore all memory is imagination though not all imagination is memory. In the case of memory there is a definite attempt to revive the total previous experience in its original grouping. This, as we have defined it, is also imagination, as it is the consciousness of objects not present to sense. But it is only one part of imagination, and is called reproductive imagination. Thus memory is only reproductive imagination. There is another aspect of imagination, in which the constituent images reproduced represent the recall of previously experienced sensations truly enough; but their grouping is new. The revived percepts have been modified, transformed, transferred and recombined. The images are reconstructed out of material stored up within the mind as a result of past experience. Although no new material had been used the old had been so combined as to give rise to an entirely new idea. Hence it is called constructive or productive imagination and since reproductive imagination is nothing more than memory, when we speak of imagination simply, we mean only constructive imagination.

The distinguishing feature of imagination is the attempt to regroup previously experienced sensations. When the mind simply reproduces, or reinstates a past experience, we have the play of what psychologists call the reproductive imagination. If, in addition, the mind recognises the experience as one which it had experienced before, we have memory. Memory is therefore reproduction and recognition of past experiences If on the other hand, the mind reproduces images and puts them together in new ways, we have the play of the constructive imagination. Imagination is sometimes spoken of as a creative faculty of the mind; but it is really a process of rearranging ideas already in the mind, of working old experiences into new forms. It is a constructive and not a creative faculty. No absolutely new element can appear. No imagination can picture a colour, which one has not seen, a taste which one has not met in one's experience, or a smell which one has not encountered before. It is impossible to create in the mental as in the material world.

Examples of both kinds of imagination are easily available. A teacher takes his pupils to a neighbouring hill. They note the time it takes to ascend it, the nature of the soil, the vegetation, the coolness of the atmosphere. After the return, the image of the hill is brought back to their minds by memory and this is a case of reproductive imagination. Now on the basis of this idea of a hill, the teacher tries to build up the idea of a mountain. He speaks of a hill that takes from 13 to 14 hours to climb, whose top is bare of all vegetation, capped with clouds and snow. This is to recombine the old ideas and to create something wholly new. It had been reconstructed from their experience of a hill. The ancients saw the horse and men riding it and combined them both in the centaur. Alfred Leete makes the inventor of trousers get his idea from a Stone-Age man standing on a dolmen whose two supports suggest the legs.

In the olden days people thought that imagination should be sternly repressed as of no practical use; but now its importance is being recognised. The gardener who plans a new garden, the landscape painter, the architect, the mathematician, the engineer, the breeder should all sense what is not there. It is not merely to the poet, novelist, artist, musician and inventor that it is of use. Back of every object in the world is an idea which is its creator, and which is arrived at by recombining previous ideas and making a new idea of it altogether; or in other words by means of the imagination. The value of memory consists in the fact that

experiences, repeat themselves in exact copy. Imagination makes it possible for us to deal with changing circumstances, as memory adjusts us to unchanging circumstances. In any matter which is strikingly new we can no longer depend upon our memory of previous experiences alone to help us out; but we are compelled to adopt a hit-or-miss policy of reacting, or to attempt to recombine or rearrange various elements from our previous experiences by our imagination in order to try and find out the correct method of reacting. Failing to do this we remain for ever in bondage to the past. Very often we rearrange and recombine for the purpose of realising the new whole, for realising's own sake. In this aspect it is a recreation. But the greatest use is in imagining new situations altogether and then being prepared with the response for such situations. This is foresight. In its highest form, in the form of ideals, it makes men strive to be better and to be more efficient. Therefore progress depends on it. In science it yields hypothesis; in ordinary life it makes the bright person.

There are different classes of imagination. It is *imitative* as in the case of a person appreciating the work of another whether it be a poem, picture or book. It may be *creative* as in the poet, painter, musician or architect. Creative imagination is divided into two kinds according as the standard of excellence is external to the man or internal. The first is the *Pragmatic* type (e. g. a bridge), while the second is the *aesthetic* type (e. g. the book or poem). There is the third type which is much freer and is seen in day-dreaming. It is called *fantasy*. It is this kind that has brought imagination into disfavour with people like Madame Montessori, who is against fairy stories. There is another classification of productive imagery into Fanciful, Realistic and Idealistic. *Fanciful* imagery is characterised by its spontaneity, its disregard of the probable, and the possible, its vividness of detail. It is its own reward and looks to no result beyond itself. Little children's imaginings are of this type — it is their play world of make believe. The incongruity and absurdity of their images have been compared to the dreams of adults. Lacking in experience, without knowledge of natural laws, the child's imagination runs riot with the materials it has at its command. Thus a broomstick becomes a horse. Some adults still retain it to a high degree as the creator of *Alice in Wonderland* or that of *Peter Pan*. All adults in their castle building indulge in this type of imagery to some extent. *Realistic* imagery adheres more strictly to actual conditions and deals with the probable. It is usually constructed for a purpose, being put to some use beyond itself.

It lacks much of the emotional element possessed by the other two types This is the kind most valuable in reasoning and thinking. It deals with new situations, constructs them, creates means of dealing with them and forecasts the results. It is the type called into play by inventors, craftsmen, physicians, teachers — in fact by any-one who tries to bring about a change in conditions. This is the type most interesting to grammar school pupils who demand facts not fancies. This is the type most active in effecting changes in a world of things. *Idealistic* productive imagery does not fly in the face of reality as does the fanciful, nor does it adhere strictly to facts. It deals with the possible—with what may be, but is not yet. It always looks to the future, for if realised it is no longer idealistic. It is enjoyed for its own sake, but does not exist for that alone but looks towards some result. It is concerned primarily with human lives and has a strong emotional tone, It is the heart of ideals. The adolescent revels in this kind. His dreams concern his own future, his service to his fellowmen, his success and the like, and involves much idealistic imagery. Hero worship demands it and it distinguishes the man of vision from the man without.

These three classes seem appropriate to the three different stages of man. The imagination of childhood might be characterised as exuberent. It draws little or no difference between fact and fancy, its exaggerations are not falsehoods and its wonderful creations appear thoroughly real to consciousness. It is the great period of fairy stories, Santa Claus, epics, stories of the martyrs and the like. The imagination of youth might be characterised as idealising. Distinction is made between appearance and reality: but the future and unknown reality are painted in roseate colours. The actual experiences of life are lifted up into the region of idealisation and the large generous ideals of human nature are seeking realisation in life. It is the period of the hero of romance and adventure, of fiction and good history. The imagination of man might be characterised as disciplined. Reality has assumed a more sombre hue, the vision once so moving has become familiar, the light of common day is over all. The man travels more patiently towards his great and remote goal. It is the period of the artist, the poet, inventor, the discoverer, the captain of finance and industry. The child's wonder book, the youth's dreams, and the man's purposes seem to be the order of development. "The boy's dreams, the youth's plans, the man's deeds" (Ludwig: *Napoleon* p. 568).

In the earlier stages especially, it is necessary to see that measures are devised to secure the relevance of the ideas suggested to the matter in hand. The child should therefore be taught to take up a critical attitude. This is effected by providing an external check or control. Some practical result might be made to depend on the process of imagination. The correctness or incorrectness of the result, therefore serves as a check. Thus the child may be asked to illustrate a story. The aptness or otherwise of the illustrations would be the test of the relevance of his imagination and the necessity to embody it in the illustrations would at the same time discipline it and relate it to practical needs. There are some people who get a great number of ideas on any particular matter; but these are irrelevant, and serve only to confuse them. This is due to the manner in which the original impression had been disposed of. Some minds are in confusion; other minds are well ordered. One is like a desk where things are thrown anyhow higgledy piggledy; another is like a desk where everything is pigeon-holed and classified. Therefore it partly depends upon how an original impression had been assimilated, whether it shall be easily available when and where wanted. Children who had been taught a rule and made to work problems on it might be given sums, involving a choice of processes. When a pragmatic test is thus applied to imagination, it will be discovered that imagination is useful so far as it subserves a practical purpose. Such practical problems are best connected with some felt need of the child or interest. Again it is not desirable to train the imagination in isolation. Still at a time when the child is only capable of working out relatively simple problems which do not call for a very elaborate exercise of the imagination, his imagination itself is capable of very much higher flights. Therefore give plenty of opportunities for the exercise of the imagination, with a view to its functioning later in thinking, and provide some means by which in certain cases of creative imagination, a check is placed on the relevancy of the child's ideas.

People differ, not merely from one age to another as regards their imagery; but they differ as man to man. We all differ as to the sense through which we mainly get our impressions, and revive the same. We *do* get impressions through all our senses. But we also have one sense through which we prefer to take our impressions. According to this preferred sense, pupils are classified as eye-minded or visuals ear-minded or audiles, motor-minded or motiles, touch-minded or tactiles. These are therefore, different ideational

types. Thus Edridge-Green mentions the case of a person who was unable to receive visual images. Even if his mother sat opposite to him, he will treat her as a stranger until she began to speak. What is known as "finger memory" is a case of kinaesthetic imagery. Scribe and Legouve, two collaborating playwrights, describe their experiences as follows, Said Legouve to Scribe. "When I write a scene, I hear and you see. At each phrase which I write, the voice of the person speaking strikes my ear. The diverse intonations of the actors sound under my pen, As for you. who are the theatre itself, your actors walk, they bestir themselves, I am auditor; you are spectator". "You are right" said Scribe "when I write I am in the middle of the stalls" (La Rue p. 285). Some learn through the eye, others through the ear, others by doing, still others by touch. Though present-day Psychology does not believe in the existence of such marked types, (Fintner. p. 248). the pedagogical implication is, that in a class we may have representatives of every one of these types; and so we should appeal to all the senses in our teaching, "Chalk and talk" is a good maxim. The children should if possible see, hear, handle, write and in certain cases, smell and taste the new stimulus. Another truth for education lies in the material needed for imagination. We have said that sensory material is necessary for any flights of the imagination Hence we should bring most of the senses into play. The greater the number and quantity of the sense impressions, the more broadly developed is the imagination. The imagery of to-day is the effect of the sensory experience of yesterday. The following passage from an essay by Mr. Squire would strike the auditory imagery of only those, who had heard the sea of a night from a cottage near the beach. "The screaming of the gale had dwindled into a fitful grumbling; the recurrent boom and crash and hiss of the sleepless North Sea on the shingle below the cottage was soothing'. A fund of such sensory material is necessary for the proper appreciation of literature. Indeed Mr. Kerfoot in his book on "How We Read" goes even so for as to say, that our reading is like a cinematographic reel, in that the symbols that we see throw on the screen of our mind's eye, pictures summoned from our past experience. Such facts about the sensory basis of imagination, again emphasise the necessity of teaching through the senses. Our teaching should also bring out the characteristic quality of everything, since we tend to imagine a thing in terms of its characteristic quality. Even though each of us might have different types of imagery, to all of us the image of a bell is somewhat auditory, of a portrait some-

what visual, of the sea some what muscular, of velvet somewhat tactile, of an apothecary's shop some what olfactory. It is this characteristic quality that our teaching should educe. Thus teaching should bring out the roar of the Niagra, the vision of Mount Blanc, the surge of the sea and the smoothness of the marble statue.

Certain occupations help to train imagination. Stories should be illustrated by pupils with drawings ; reading should be accompanied with inward vision ; exclusive reading of the illustrated papers and magazines should be avoided as leaving the imagination nothing to do ; descriptions of natural scenes in fiction should be inwardly imaged, the features of a continent should be so visaged ; the scenes of past history should be relived in the mind, Manual training and drawing develop the imagination, as embodying in concrete shape the imagings of the mind. The constructive imagination is educated by the study of literature. The juvenile myths, fairy stories and hero worship, create a world of fancy to which you could retire as a refuge from the hard realities of life. Poetry and elevated prose require imaginative interpretation. The teacher should exercise the productive powers of the child. He must encourage story inventions, permit personal creations in drawing and manual training, encourage the writing of verse, edit a school magazine, let the pupils imitate literary models, plant a school garden and hold a school exhibition. These are to give practice in the re-combination of images. All imagination involves two processes, the isolation and re-combination of experiences. Certain elements have to be isolated from a complex experience and retained. We shall see how this is done when dealing with conception. The more completely this isolation is effected, the easier it is for the idea to combine with others. In teaching fairy stories, we should begin young and avoid gruesome materials such as witches, evil spirits and hob-goblins. This will avoid a disordered imagination, as will the exercise of the pupil's pity in real as opposed to imaginary cases. History and Geography should begin at home, and on the basis of what is known, should be built what is unknown. Models and pictures are valuable aids. So are the teacher's word pictures when they are good. Some teachers explain too much. They leave nothing for the imagination to play upon. (Read Colvin: *The Learning Process* Chap. 7).

Transition to Thinking.

Strayer and Norsworthy: How to teach pp. 97 ff.
Bagley: Educative Process Chaps. 8, 9, 10.
Burnett: Essentials of Teaching Chap. 4.
Dewey: How we think.
James: Talks to Teachers XIII.

Imagination occupies a central position in the intellectual life. It stands at the parting of the ways. In one aspect it approximates to memory, in another it merges into thinking. In one aspect it revives previous sensory experiences; in another it puts those experiences together to create new forms, thereby becoming akin to thought. The old psychologists thought, that the whole of a man's mental life consisted in the perception of agreement and difference, retentiveness and the two sorts of association—contiguity and similarity—and that these were all that was meant by intellect proper. They said that the laws of association were capable of explaining every thought connection. Herbart interpreting association as a causal link between ideas, has employed it in this sense, for the construction of a real mechanics of ideas and their relations, their rise and fall. They said that these laws ran the mind and that even the will arose out of them. We have already seen that the Herbartians had neglected the emotions. Ideas are not solely dependent one upon the other. Very often they depend upon our temporary moods, the state of our health and our emotional tone. Herbart's notion of mechanical ideation cannot therefore be accepted in its entirety. Man has a limited power to control his associations and it is this power which differentiates him from the brute creation, as a *thinking* animal and as a rational being. To think is not merely to have a succession of associated ideas. If this were so the higher animals could think. These could perform intelligent actions based upon associated ideas. There is the example of a dog, which when he hears the whistle of his master outside, gets out of the room, rushes into the garden, lifts a latch, opens the gate and joins him outside. The psychological explanation of this would be as follows. The whistle recalls the master by simple contiguity. He has associated pleasurable experiences with that whistle. He therefore, immediately bounds forward to join him. This is canine thinking, dog's logic and is akin to a great deal of human thinking. It is called habitual thinking or associative thinking. But surely the latch-lifting is a superior order of thought. But even that, on scrutiny resolves itself into a piece of associative thinking. One day, perhaps

the dog nosing about the gate, hit the latch and thus released the catch. The excitation of the associated ideas—latch nose action, open-gate, would result in freedom for the dog. A boy under similar circumstances would behave differently. Boy and dog will behave in the same manner, so long as thinking is on the habitual plane. But as to the opening of the gate, boy and dog undergo a different mental process. The dog's action is automatic, the boy's action original or creative. If instead of a latch we have a bolt, the dog will be puzzled. But the boy argues that a gate is meant to open. From his previous experience of similar situations he looks out for the obstacles that keep it shut. If it is a bolt, he draws it; if a latch, he lifts it; if a stone, he rolls it off. The boy's associations are productive. They enable him to adjust himself to varying circumstances. The animal's learning has been called perceptual learning as against the conceptual learning of the boy's. An animal is found to work out of a maze in less time with practice than in the beginning, but it has to re-learn the maze if a slight charge is made. On the other hand the boy would carry over something from his experience with the first maze that would make the learning of the second one much easier (Read Woodburne: pp. 90—108).

Therefore there are two kinds of thinking—associative thinking which man shares with the lower animals, by which he simply affirms or judges that things *are* or by which he recognises the facts of sense; the second distinguishes him from the animal world and by which the mind draws conclusions from the facts presented by the senses. It is the latter we call reasoning. It is one of the main tasks of the teacher to enable his pupils to think, to reason properly and to draw inferences. These inferences are very important, because it is they which enable him to adjust himself to changing circumstances.

We have said that it is by thought that we adjust ourselves to varying circumstances. A contrast with habitual adjustment would make matters clear. The essence of a habitual adjustment is that it is automatic—it happens without the interference of consciousness. This is because it had been mechanised by constant repetition in response to a situation that repeats itself indefinitely. But there are many situations which do not so repeat themselves and hence adjustment to them could not be mechanised by practice but has to take place each time consciously by judgment. Therefore habit adjusts us to uniform situations while judgment

adjusts us to varying situations. Let us take an example. A cyclist has to balance himself every day consciously; but with practice, balancing becomes automatic, consciousness being called in only when the balance is upset, if even then. Ninety-nine per cent of a captain's duties, are of the habitual type, mere routine. But when a storm arises and the ship has lost its way, and everything is in confusion, he is faced with a situation for meeting which he had been placed in a privileged position. It does not happen every day and perhaps it might happen only once in a life-time. His habitual adjustments will not help him here. He must recall any similar occasion in his or other people's experience, must search out all the principles that bear on his profession, and must devise some plan which would meet the needs of the emergency. This is why generals, admirals, business leaders and people who hold places of trust and responsibility are so highly paid. They are tested only once in a way; but at the critical moment they should not fail. Cheap guns which would not go off at the critical moment and bayonets that bend are dear at any price. Hence the work of a general who can see a people through a crisis cannot be measured in £, *s*, *d*. This is what is meant by describing Wellington "O, iron nerve to true occasion true". Such people meet situations which are unique and on their ability to face them hang momentous consequences. The Silesian marshes always formed a great factor in the German defensive scheme against Russia. Hence military manoeuvres were often held against an imaginary Russian expeditionary force. The great point was to outmanoeuvre the invading army into the marshes. There was one general who always succeeded in this unfailingly, and this was Hindenburg. Whoever was his opponent stood at the end of the day knee deep in mud; and it is said that this happened, even to the Kaiser himself. At last the long-looked for Russian expeditionary force came and Hindenburg was immediately placed in command and as unerringly as ever, manoeuvred two army corps into the Masurian Lakes in the famous battle of Tannenburg. Such a man is out of the common ruck of mankind. He goes not by the beaten path, but strikes out original paths. This he does by thinking.

Therefore there are certain occasions when instinctive and habitual adjustments do not suffice. An instinctive adjustment is a type of reaction which had been selected by racial history as the best suited for the life of the organism. When we hear a loud report, our mouth opens and our hands automatically go to our ears. In this manner we

save our tympanums, without in the least giving a thought to it. We close our eyes instinctively when we look at a bright light. There are very many situations, in which this kind of instinctive adjustment is quite adequate. There are other situations which repeat so very often in every day life, that it is better to habituate our adjustments to them. A man buttons his coat without knowing it. Situations that repeat themselves in the history of the individual have the adjustments also so often repeated, that the reaction takes place reflexively, subconsciously, without focalisation in consciousness. New situations however, could not be reacted to in a habitual or an instinctive manner, but only by means of thought. This way of reacting is called a judgment and a judgment is defined as an act which results from the facing of a given situation in which past experience is consciously brought to bear upon the solution of the problem. It is always an act stimulated by some set of conditions which needs readjusting and its outcome is a readjustment whose validity can be tested only by its adequacy. In thinking we proceed from what is presented to the senses, to what is not so presented. We proceed from sight to insight from the known to the unknown. It involves a leap into the dark and so is creative. There are two ways in which past experience can be applied to a present situation *concretely* as in the Practical Judgment, in *condensed* form as in th Conceptual Judgment.

The *Practical* Judgment. Some features in the situation to be faced recall a similar situation previously faced, similar in many details. This brings to mind the former reaction and on its basis a new reaction takes place. For example some one is severely burned. No assistance is within call; but there is some one who had watched a doctor dressing a similar burn, and he dresses the present one in the same fashion. A single concrete past situation is revived and applied to the present one. This process involves certain kinds of mental activity- No two situations are exactly alike. Therefore the correlation of these experiences depend upon the capacity to analyse the experience and to see the relation. This done, there is a synthesis of parts that bear on the present situation. It also involves comparison and abstraction. Two or more common elements are compared and abstracted. The practical judgment has its advantages, Habitual and instinctive adjustments involve a great deal of waste. They require numberless experiences, either racial or individual, in order that they may become fixed. In the practical judgment one single experience serves to insure an adequate judgment. Its limitations are that it is seldom

that we come across two situations that resemble each other in many details, bearing such resemblances on the surface. Besides such an experience has to be revived in all its entirety. Animals and children seem to be capable only of the Practical Judgement. (Bagley:134—136).

The Conceptual Judgment. Take the example of the doctor's servant dressing the burn. The two situations being identical the quack did not do any mischief. It was a case of all's well that ends well. But if the resemblance had been superficial, while fundamentally the two differed he would have committed incalculable mischief. The physician, on the other hand, would see more deeply and see true, not because he has *more* experience and therefore can select the one applicable for the case in hand. But many examples had been so combined and correlated as to extract the principle in which the doctor had been trained. To the making of this principle not only his individual experience; but the experiences of the whole race had contributed. For the ounce of principle, whole tons of experience had gone into the melting pot.

Before, therefore an experience could function properly it should be carried in the mind in a condensed form. A large number of experiences means so much of detail that may be irrelevant. Perhaps the point relevant to the matter is enmeshed in a complex which superficially has no resemblance to the case in hand. The resemblance is deep, underlying and fundamental. This is called the principle or the essence. By means of condensation this principle has to be precipitated and the condensation is carried on by the formation of concepts.

Conception

Bagley: Educative Process Chap. 9.
Burnett: Essentials pp. 59-66.
Dexter and Garlick: Psychology Chap. X.
James: Talks XIII Horne: Principles Chap. XII.
Dumville: Fundamentals Chap. VII.
Betts: The Mind and its Education Chap. XII.
Ross: Educational Psychology chap 12.

The condensation of concrete experiences, is not a mere compression but a picking out of the salient, the prominent and the significant features and the rejection of those features which are merely accessory. This is done by the processes of analysis and synthesis. Analysis breaks up the experience into its component parts and by comparison and

contrast, selects the relevant parts and rejects the rest. This process reveals the *relation* on which synthesis proceeds to build the idea in the form in which it is carried in the mind. This form represents a sublimated essence or a form of abstraction and generalisation and is given a name which is the word which describes it. Some insight can be had into the nature of concept formation, if we examine two classes of concepts. (A) *Collective* concepts. Examples of these are to be had in common nouns. Some objects have certain features in common. They may differ in other respects, but their common features gather them into a class. This constant common quality we perceive as a relation and give it a name. Thus we abstract a few qualities from a group and endow them with a name which would enable the idea to be commonly used e.g., man, which we abstract from Chinamen, Negroes, Whites, Indians. The greater the number of objects included the fewer the common qualities and the more abstract the relation. Technically speaking, the greater, the *extension* the less the *intension* and vice versa. Thus vertebrate has more extension than horses which has more intension, (B) *Individual concept.* From what we have said above we are apt to get the idea that the concept is something abstracted from several objects rather than from several experiences. This is not necessarily so. Our know ledge of an object varies with the number of experiences we have had of it. Thus my concept of my friend is derived by condensing my several experiences with him. I meet him in office, I meet him in sport, in his family, at his club. Particulars and details fall away and only permanent features remain.

We shall now consider in detail, how the concept of a dog, for example is formed. The child at first looks upon the dog as a whole ; but he comes to have experiences of it and he begins to pay particular attention to details, and his knowledge of it begins to increase, Supposing he first comes to know a sheep dog perhaps his percept of it is that it runs, barks, has four legs, is larger than himself, and has a coat. If he sees a retriever next, his percept of it is that it runs, barks, has four legs, is larger than himself, and has a black coat. From these two percepts the child abstracts the four common features and thinks them into a "notion" dog having these four properties. Next let us suppose that the child sees a spaniel. It runs, barks, has four legs, is smaller than himself. Once again the dissimilar elements neutralise themselves, while the similar elements fuse and get stronger and a new "notion" dog is formed, as of something which runs about, has four legs and barks.

This notion is no percept because it is not referred to an outside object. It is no revived image because it had been no percept It is not a constructed image, or creature of the imagination, because though the images are taken from different percepts they are percepts of things having innumerable resemblances. It is not definite enough. Indeed the child has combined three percepts it had of a dog, and made them into one concept. Thus conception is the power to think, individuals into classes, particulars into generals, the many into one. The concept so formed is more inclusive than exclusive. Thus the concept of the cat family is said to be the highest common factor of our perceptions of cats, lions, tigers, panthers, pumas, wild cats &c. The concept of the cat family here made may be very shadowy but it is the result of greater knowledge and so implies the knowledge of particular facts in each case. A few matters may be noted in the formation of concepts. Sensation is the basis of conception. Sensations produce percepts which yield images and images give rise to concepts. Percepts must be, in order that concepts may be. A knowledge of things therefore, is a necessary preliminary to the process of conception. Knowledge is at first individual and concrete, then general and abstract. Concept building proceeds gradually with our increasing experiences of things.

There are several stages in concept formation. The first is observation. Two or more things resembling each other are brought together and observed. The next stage is comparison. These are compared and contrasted. The third stage is abstraction in which the resemblances are abstracted and grouped to form the concept. Finally the concept becomes clearer in the mind, other individuals having resemblances are brought into it, until we reach to a class which have certain qualities in common. Therefore a concept has always a two fold characteristic, one relating to its construction, another to its application. From this point of view we may define a concept as."When an element common to many experiences, is not merely recognised when it appears but (1) is thought of without being perceived and (2) is capable of being combined in thought with other elements, it becomes a concept of general meaning and application. To be a general concept the element must be something for consciousness apart from its perceptual setting, and it must be applicable to a different setting." It is by means of concepts or patterns in the mind that we interpret new experiences. There is nothing to prevent us taking a particular arrangement of lines as a parallelogram but the constitution of our

mind may interpret it, as an open book. This is the application side of the concept.

Concept formation is of the greatest importance in mental life. All thinking is based upon and results in concepts. From observation of individual facts we make concepts, we join concepts into judgments, and we string judgments together in reasoning and arrive at general laws which form the body of a science. The validity of the general laws we deduce, depends upon the truth and the fulness of the concepts. They are the brick of which our mental edifice is built. Conception culture makes the higher reasoning possible. The higher reasoning is concerned with classes and not with units, and conception which deals with classes, is really the first stage in reasoning. Naturally, conception culture increases the number and vigour of mental operations since many important mental faculties are involved in an act of conception. Conception culture economises mental force, since it is the power to think the many into one. If we did not possess this faculty we shall find our minds overburdened with innumerable particulars. There are several reasons why the teacher should interest himself in concept building. Without he exert himself in the matter indistinct concepts might exist in the minds of the pupils. These are due to indistinct percepts such as the one that makes a child call every one "dada", or to lack of observation which makes many call the whale a fish, or to imperfect abstraction as when children apply the term circle to a ring or to the loose use of language as when we call every boy "bad" without he deserving it to the full, or to lapse of time which makes the memory lose its hold on the distinctive features of concepts. It is the work of the teacher to remedy these defects, and to build up good concepts the marks of which are that they should be founded on concrete examples, on wide experience, and that they should be definite and clear cut, so that they may not coalesce with others.

The teacher's function is largely to fill the concept. Let us first see how the concept of an orange is formed in the mind of a child. He first sees an orange and that gives him a vague impression of the orange. This is his first idea of it. If this idea or image is revived in memory or survives in the mind in the absence of an actual orange, we have a concept orange. If the child has nothing more to do with an orange the concept would remain relatively blank. Very often our adult concepts are not much fuller than this e. g. our concept of a persimmon or of broccoli. When the child, on the other hand, has more to do with it, the concept becomes richer. The orange resists touch, it has mass ; it is

lifted, it has weight. Its shape is found to be a sphere. When held close to the eyes, it is seen to be pitted with holes. It is tasted and smelt. To this complicated concept a name "orange" is given. Hence it is fairly obvious that the name wouid signify different degrees of fulness of meaning to different people. The qualities included in the name are called the *connotation*.

In building up concepts we should proceed from the particular to the general. This lies at the root of all rational instruction. It says that there is no royal road to learning; no way of reaching to a concept except through the various stages of condensation. Again it need not be from particular objects but only from particular experiences and neither need it be from details to masses. Mind does not move from details to masses normally; but from a vague and homogeneous mass through analysis and synthesis to a definite heterogeneity. Again it is not necessary to hold that we always proceed from particular facts to general laws only. Often we proceed from less general laws to more general laws. Thus from the statement that hot water breaks glasses, we proceed to the law of expansion by heat. Kepler discovered the laws of planetary motion thereby bringing the particular facts of his observation under the general laws. Newton brought these laws under his more universal law of gravitation. The whole progress of Science has consisted therefore in bringing particular facts under general laws and general laws under still more general laws. This is to emphasise the necessity for studying by the inductive method.

We have said that we grow more and more abstract as we grow old. Therefore the kind of instruction given should be suited to the stage of growth (James p. 146.) During the first seven or eight years of childhood, the mind is most interested in the sensible properties of material things. The instinct of constructiveness accumulates a large number of physical conceptions, which are the basis of all knowledge. Object teaching and Manual training wisely extend this sphere. Not till adolescence, is the mind able to take in abstractions, to see hidden relations, similarities and distinctions and causal relations. I ational knowledge or the sciences might be acceptable now. Much later does the mind awake to purely abstract relations—metaphysical and moral ideas. We must strike the iron while it is hot. Each period must be devoted to the appropriate studies. Otherwise the mind would be starved for lack of them, and if any study comes before its time, it is likely to prove a failure.

Thus James speaks of some pupils of his, who had become incapacitated for the study of philosophy because they had taken it up a little too early.

School lessons may be utilised to improve conception. Object lessons are useful. The device of juxtaposition should be used to enable the pupil to compare, to contrast and to abstract the relation and to form classes. Perceptual learning is the first aim of object lessons; but if they stop merely at perception, they are a waste of labour. They should give rise to conception. Elementary science, for example Botany, is very good for improving the powers of classification. The pupil must himself be made to classify. If the teacher does this for him, it is like digesting food for another. Composition is a good training in concept making, which is aided by sentence construction, provided the pupil tries hard to get at the real meaning of the words.

Verbalism.

We have spoken of the formation of concepts as consisting in the condensation of experiences dropping concrete imagery and making the word the representative of the idea more and more. As people grow in age, investigations show, that they progressively drop concrete imagery and come to use the abstract word oftner and oftener. This is much more the case with men of thought, who as discovered by Galton's investigations, use very little of concrete imagery and more of verbal material, as lending itself more efficiently to thought. These go to show that words must prove the vehicle of instruction as the child grows older and older and that words, words words must constitute a large part and an always growing part as life advances, of what the human being has to learn. This makes it all the more necessary that the meaning of the words should have been properly acquired. They should never remain mere words, but should carry their proper significance. Too often it is not so and children know the words only and not their meanings. This must certainly be the explanation, where a boy rendered the definition of a point "denoting position without length, breadth or thickness" as "denoting a physician, without strength, health or sickness" and the equator as a "menagerie lion running round the earth" instead of "an imaginary line running round the earth" An inspector asked, a class "If we bore a hole sufficiently deep into the earth would it be warmer or colder at the bottom"? The class did not answer. Then the teacher said he would put the question in a different manner, and asked

them "in what condition is the interior of the globe ?" and got the answer "In a condition of igneous fusion" which shows that only the words and not the meaning, had been learnt. Therefore we should take care that our teaching does not descend into verbalism.

In conceptual education it is the duty of the teacher to see that the condensation of experience really takes place and is not taken for granted. In doing this he must notice that concepts are not so much generalised from particular objects as from particular expeiiences. The pupil must be subjected to a number of experiences of the concrete order, and led consciously to make the analyses, comparisons and abstractions that are necessary to the formation of a concept. Thus in the Type Method in Geography where a single river system is studied as a type, pupils will draw, model, picture it. From these experiences they would form a general idea which would not be in any way interior to that formed according to the older methods of teaching Geography in which hundreds of systems were compared. This is why the Memoriter Method in Geography is condemned. In Mathematics too, the abstract conceptions should be manufactured by the pupil from concrete material. Otherwise for example the number ten would mean very little to him. This is why we say, that an abstract body of knowledge can be rightly acquired, only when it is abstracted and felt to be abstracted from concrete material. This once again imposes on us the necessity to employ things before words. Our lessons should start in the concrete and end in the abstract. Examples and details should precede rules and formulae. But many start from the concrete and remain in the concrete. Many believe, that Geography should not only begin but end with the school yard and the neighbouring hill, that Physics is an endless round of repeating the same sort of tedious weighing and measuring operations ; whereas a very few examples are usually sufficient to set the imagination free on genuine lines ; and then what the mind craves for is more rapid, general and abstract treatment. Therefore there must be a progress from the concrete to the abstract. Thus abstract ideas may be used in teaching little pupils, the only caution being that the teacher in some way should find out that the meaning given to them by pupils correspond to his. Otherwise it would lead to ridiculous results. Thus a person explained the passive voice by the example "Suppose you kill me : You who kill are in the active voice and I who am killed am in the passive voice." "But how can you speak if you are killed ?" "You may suppose I am not quite dead."

This made the child define passive voice as "the voice you speak with when you are not quite dead." The defect here is that the child was not able to make the abstraction necessary for lack of material. Therefore there should have been varied illustration. Again another child mistook the word "penitent" in the line "while like a penitent I stand" for "pennytent" and found no inward difficulty. Here the teacher should have brought the child's knowledge to some practical test such as a diagram or questioned him, in which case the misconception would have been laid bare. Again in the ballad of Lord Ullin's daughter in the line.

I'll row you o'er the ferry
It is not for your silver bright
But for your winsome lady,

many children think that the lady should be handed over as the ferry due. A mistake like this can be avoided by varied statement.

Verbalism constitutes one of the major problems of teaching. It is generally caused by four conditions, namely the isolation of the school, the symbolic character of the subject matter, the passivity of the learner and the limitations of the teacher. The school is removed from the haunts of men and the stage of real life. The cries of the market place are not round its ears, and the life of the streets is not before its eyes. This must needs be so, otherwise systematic education could not be carried on. But its evils should be avoided. This could be achieved by making excursions, by prescribing work for pupils which involves out door observation, by recalling to their mind in the course of the class work their experiences outside and by showing specimens, models diagrams, or pictures of the objects about which they are being instructed. The symbolic nature of the subject-matter arises and exerts its influence through the text-book which is often the centre of instruction. Language is highly symbolical; and as was pointed out above, if the meaning of words had not been properly acquired, misconceptions are created in the minds of the pupils. If pupils are to acquire words in a significant or meaningful manner, they should be led to see the realities back of the words. The passivity of the pupil makes him depend too much on the language of the teacher. The new activity programmes avoid this evil. The teacher's equipment and attitude are important factors in overcoming verbalism. The teacher should not lead the life of a recluse but should come into contact with men and things. He must have some interests

and hobbies outside his profession. He should be always on the alert to notice any verbal misunderstanding that may arise in the minds of the pupils. By questions he should disclose them and by showing concrete objects and by explanation and varied statement correct such misconceptions. (See Ruediger: *Teaching Procedures* Chap. 16.)

Judgment

Dexter and Garlick : Psychology in the Classroom Chap 11.
Horne : Psychological Principles Chap. 13.
Welton : Logical Bases of Education Chaps. 5 and 6.
Burnett : Essentials of Teaching Chap. 4.
Bagley : Educative Process Chap. 10.
Dewey : How We Think Chap. 8.
Sully : Teacher's Hand book of Psychology Chap. 12.

Judgment has been described as active intelligence. However much of knowledge we might have, it can only be an incubus and a dead weight, unless it functions in making us meet efficiently the situations that life provides. When we thus face the situations of daily life and readjust our reactions with that purpose in view we are said to perform an act of judgment. "If our schools turn out their pupils in that attitude of mind, which is conducive to good judgment in any department of affairs in which the pupils are placed, they have done more than if they sent out their pupils merely possessed of vast stores of information, or high degrees of skill in specialised branches" (Dewey.)

We are said to judge whenever we go through any mental process which ends in affirmation or negation of something. There are three features to a judgment, (1) A controversy consisting of opposite claims regarding the same objective situation (2) a process of defining and elaborating these claims and of sifting the facts adduced to support them (3) a final decision or sentence closing the matter in dispute, and also serving as a rule or principle for deciding future cases. (1) There must be uncertainty, otherwise the situation would be taken at sight and there would be perception. If it is wholly dark, there is a mystery and no judgment occurs. But if it suggests rival meanings, there is some point at issue, some matter at stake, exactly as the case before a judge. We see a blur in a distance. What is it? Is it a tree? dust? a man? Only one of these suggested meanings can be true. Yet all the suggestions have point. How is the perception to be interpreted? Such is the situation in which a judgment

takes place. 2. Then comes the trial, which consists in the weighing of the evidence on both sides. The questions to be decided are (*a*) what are the significant facts? This means selection and rejection. To do this well means tact, knack, cleverness, insight, discernment which are the marks of the expert, the connoisseur and judge. Practice brings this to a high degree of perfection, which cannot even be reduced to principle or transmitted. Thus Mill speaks of a case in which a Scotch manufacturer obtained the services of a dyer, who was famous for producing colours, to teach his art to the workmen in his factory. This the dyer was unable to do, because he mixed the colours not by weighing but by picking them up in handfuls. This might be called intuitiveness, but ordinarily selection and rejection mean feeling one's way and so depend upon alertness, flexibility, curiosity and the capacity to hold judgment in suspense. (*b*) Having selected the appropriate meanings, they are elaborated and used in interpreting the situation, (*c*) Every judgment ends in a decision and if this decision has been proved to be true, there is a tendency to judge future similar situations on the same basis. Thus judgments get standardised.

When a judgment is expressed in words, it is called a proposition. Every form of knowledge and of belief exists in the form of a judgment or mental assertion. We come across judgments mainly in the form of propositions. Hence it is necessary that we should remember, that the judgment is a mental act and not the proposit'on or the words in which it is clothed. Very often the verbal form of the judgment fails to express its real meaning. So we have to interpret every judgment we receive from others, just like every other piece of experience. Having gone behind the words and decided the real meaning we accept or reject it, or suspend our judgment. Therefore in the first two cases we had performed further acts of judging. Judgment as a mental act always claims to be true. No one can judge what he believes to be false Anyone judgment might actually be proved to be false; but he who makes it believes it to be true at the time. Thus a judgment can be a falsity, but never a falsehood. One who makes a judgment might think it to be false; but we are not concerned with what he thinks it to be; but with what it is in actual fact. Because every sentence does not express a truth, not all sentences are judgments. Thus a sentence might express a wish, a command, and these are therefore no judgments e. g., "come here John". A question cannot be a judgment. Further nothing but a judgment can be true or false; for by fact we do not mean an occurrence in the external world, but such

an occurrence as known and judged. When we judge, we assert what we believe to be true and such assertion is not arbitary; but is based on sufficient grounds which would force every rational being to make the same judgment. To say therefore that a judgment is true, is to say that it accords with reality. But reality exists for man only so far as he is aware of it. Therefore every judgment is occasioned by experience. Each experience has to be interpreted before it can become knowledge. Such experience harmonises it with what knowledge we already possess or, in other words, our ideas.

Every judgment is also an act both of analysis and synthesis. The piece of experience we interpret by our judgment, is not the whole of the experience, but only a portion selected for attention. Thus when I say, "This room is warm," only one feature of the experience is singled out. Therefore a judgment is an act of analysis or of selection. Again the idea is further analysed into temperature and excessive temperature. "A bird flying" has two such parts, though it is but one experience. Birds have many other aspects besides flying, and many other things could fly besides birds. The judgment is therefore an act of synthesis, in that it brings the two ideas of birds and flight together. Because a judgment is usually expressed in words as a proposition and because two experiences are brought together, the idea of synthesis is more prominent than analysis. The judgment has three parts—the Subject Predicate and the Copula. The logical subject is that part of the experience interpreted, from which the thought starts, and by the logical predicate is meant, that further movement of thought which makes the experience more explict. The copula is the present tense of the verb "to be," with or without the negative "not" which separates subject and predicate. The name suggests a coupling of two ideas, as indeed it is often compared to the coupling of two railway carriages. This is not the way to think of it It emphasises the synthetic part to the prejudice of the analytic part. Its function in 'the proposition' is to indicate that the act of judgment has taken place. The copula is not a link, but a sign of the judgment. Thus 'in the dead ride fast'. The subject is the "dead", the predicate is 'fast riding' and the copula "the fast riding of the dead". In certain cases the analysis is prominent, in others the synthesis as $3+5=8$ or $8=5+3$.

We do not always make our judgments afresh. We are born into a society and inherit a number of preformed judgments. These might have once been live judgments,

but now are dead. Once they must have been arrived at by a severe course of reasoning, but now they are floating in the society. Thus as regards social organization, religion, ethics, application of scientific principles, we simply inherit judgments which cost our ancestors excruciating pains to acquire. There is the judgment of the opposite kind arrived at *de novo* by rigorous reasoning from past experience. Between these two extremes of judgments which function either automatically as habit, or are made anew, are those which are arrived at immediately where situations are taken at a glance and demand and solution jump together, where conscious analysis and synthesis are at a minimum. These are given the name of *Intuitive* judgments as against those which are the result of more or less prolonged deliberation and are therefore known as *deliberative* or *Reflective* judgments. Most of the preformed judgments which we inherit from society are of this type. This is the field where we are all experts as it were; or at least only little children and savages are laymen. In connection with teaching and the growth of judgments, two natural types arise. The mental attitude of the teacher who is giving is different from that of the pupil who is receiving. The teacher is bringing out his stores new and old, rejecting some and retaining others. The pupil is receiving ideas and assimilating them, piecing the new on to the old. The teacher is using judgment in rejecting and retaining, while the pupil is using it in comparison and assimilation. The teacher's judgments are mainly analytic, the pupils' synthetic. Therefore *analytic* judgments are judgments previously formed, while *synthetic* judgments are used for the first time and are the results of new experience. A synthetic judgment adds to our knowledge, an analytic judgment tends to make our knowledge clearer.

Approaching the matter from the point of view of concepts we should regard the judgment as linking two concepts. Our concepts should make for efficiency of conduct and this they do by serving the purpose of making judgments. A judgment is simply an affirmation that two concepts have some sort of connection. Now just as our concepts are richer or poorer, our propositions are more meaningful or less meaningful. Thus the proposition "John Brown is dead" contains less meaning and is less wide in application than the proposition. "All men are mortal." The first are called *Singular Propositions*, because their subjects refer to single or individual things. The second are called *Universal judgments*, because we affirm something about the whole race of men. As in the case of the concept, so in the proposition

the teacher's duty is to fill it and make it more rich in meaning. In other words, our duty is to lead the pupil to form universal propositions. This makes it necessary for us to know the different types of judgment in the order of their richness. The simplest type is the *Impersonal* judgment. Examples are "It rains", "It hurts", "How nice'. Here the subject represents an unanalysed mass of experience and the whole force rests upon the predicate. In the next class the piece of reality is indicated though not named. In many cases there is no formulation in words and every act of recognition is merely a judgment of this kind. But when formulated in words the logical subject is represented by some such demonstrative words as "This"."That" "Here" "Now". Hence they are called "*Demonstrative* judgments. Examples are "Here is London." "This is an orchard".

In the next higher type of judgment, the analysis has gone further and brought out two terms between which the judgment affirms a relation. This is the judgment of *Particular Relation*. Examples are "Brighton is to the south of London. This book is heavier than that". The next type is the *Historical Singular Judgment*. Example—"Caesar conquered Gaul". The name Caesar refers to an individual who did many acts which are unified in his life and is therefore a universal. Such a judgment has therefore, both an indvidual and a universal character and forms a good transition to the universal judgments pure and simple. The next type that leads up to this is, the judgment of *Enumeration*. This takes place when a present experience is found to agree with a number of remembered past experiences. Here there is a synthesis of present with past experiences, for example "My holidays for the last five years have been spent in Devonshire". But memory constructions even when they sweep over the whole field of race experience cannot justify us making assertions which pass beyond experience. In other words, how can we utter such a truly universal judgment as "all cows eat grass"? Our experience and all the race's experience might go to assure us that all cows eat grass. But what about the cows that come hereafter? However extended our observation, it cannot be a logical justification. Thus men were proved wrong in the judgment, "all swans are white", when Australia was discovered. Hence the justification is not in sense experience but in thought. Thus we cannot assert by mere observation alone that. "every triangle inscribed in a semi-circle having the diameter for its base is right-angled." because the number of such triangles so inscribed, is infinite. Hence we can assert it only by inferring it from the known nature of a triangle and a semi-circle,

Therefore the universal judgment is true only because it establishes a relation that is necessary from the nature of the case. This is called the *Generic judgment* and its form is " S as such is P". When we have reached this point we have passed beyond the stage of mere fact; because the generic Judgment is both concrete and abstract. It is abstract because it asserts a universal connection without reference to the instances in which that connection might be exemplified in reality. Yet it is concrete in that it assumes such instances.

If we develop the abstract side of the generic judgment, we reach to the *Hypothetical judgment* the general form of which "If S is M it is P". The generic judgment implied that something in the nature of the reality makes the connection a necessary one. The hypothetical judgment makes this something explicit. Thus "If water is exposed to a temperature of 32°F, it freezes" tells us the nature of the water that freezes. When stated categorically it will be "water freezes at 32°F." Thus "Trespassers will be prosecuted" is a hypothetical judgment expressed in a categorical form. This would hold true even if there were no trespassers, and so never received realisation in fact. The actual judgment is "if any persons trespass, they will be prosecuted." In the pure categorical judgment the reference to reality is direct, in the generic it is indirect, in the hypothetical the concrete reference disappears and the judgment is purely abstract. The generic judgment with its concrete expression in the universal categorical proposition and the hypothetical, attains its most perfect form when the judgments are reciprocal. That is, when the predicate always accompanies the subject, but is never found without it. Thus every right-angled triangle, can be inscribed in a semi-circle must be as true as its converse. The hypothetical judgment explains the connection between S and P by making explicit the conditioning clause. But where shall the conditions cease? Thus "water freezes at 32°F" imposes the first conditioning clause in "when exposed to the temperature", Secondly "under normal atmospheric pressure' and so on. When using symbols the conditions may be infinite and may stop only at the universe. Hence complete explanation is possible, only when the whole universe is explained. That being impossible, it will do for our purpose if we find sufficient explanation in one of those smaller systems into which we divide the universe. To express the content of such a system is the function of the *Disjunctive judgment*, whose symbolic form is, "S is P or Q...Z'. This provides for

complete explanation within a system. For example, "Graduation at the University of London is in either Arts, Science, Law, Medicine or Music" and provided that the enumeration of faculties in the university is complete, this expresses the system in question.

There are several reasons for incorrect judgments. Lack of sufficient and clear ideas are often at the bottom of false judgments. One of the factors of judging is the comparison of ideas, i. e., of concepts, images and percepts. The more numerous, clear and accurate these ideas, the better the judgment. Children's judgments are faulty because of the fewness and falsity of their ideas Often wrong judgments are due to lack of time to examine ideas. Two ideas are presented and the mind jumps to a conclusion. This is why second thoughts are always best. We are often led into false judgments if we appropriate without examination the words of other people. This is the basis of faith, belief and obedience. It is a nice question as to how far children should be allowed to take a critical attitude and how far to accept authority unquestioningly. Require a child to accept everything on faith and you make him a docile slave; reason with a child about everything and you make him a monster. Often our feelings lead us into incorrect judgments. The wish is father to the thought. What we wish, the mind thinks. The intellect is swayed from the right path by our feeling. For example the English Professor spoken of by Dr Woodburne who of two students English and Welsh, persistently gave the poorer mark to the Welshman; but the higher mark to him when the students by arrangement interchanged names on the answer papers (p. 260). It is possible to educate the judgment if we subordinate knowledge of the fact to judging about the fact. The ability to use knowledge is far more important than its mere possession. The ability to use knowledge can be promoted, by discovering the bearings, relationships and the applications of the fact. Independent thinking should be promoted and originality encouraged. We should deal sympathetically with independent opinion and not put it down sternly with authority. We should direct thinking and nurse the spirit of enquiry. Teaching is not telling; it is stimulating to think. To investigate the truth in order to find it, is more important than finding it or acquiring it. The text book should not be memorised as finished truth summed up in convenient form; but as a guide in the investigation of truth. We should practice the judgment in every lesson whether in history or in biography. In history a boy may be asked to find out the causes of an event and in

biography he may be asked to estimate the character of a person. In science and art in similar fashion the judgment can be educated. (Horne: *Op Cit.* pp 171—175).

Thinking and Reasoning.

Strayer and Norsworthy : How to Teach, Chap. 7.
Dewey : How we think.
Horne : Principles, Chap. 15.
Dexter and Garlick : Psychology, Chap. 12.
Fraser : Psychology of Education Sec. IV. Chap. 1.

Most of the processes we had been till now dealing with have been vaguely termed thinking. The time is now come when we should apprehend what thinking is, especially because it would enable us to distinguish what reasoning is. There are four occasions when we use the term thought First we apply the word to describe everything that passes through our heads. Thus day-dreaming, building castles in Spain, are all believed to be thought. If this were true, everybody could think, because there is a succession of things passing through our minds always. Secondly it is used to describe everything which is represented to the mind but which is not presented to the senses. Thus an imagined story is often said not to have happened in real life but as only being thought of by the inventor. In the third case the term is used to describe a belief without stating the grounds on which it is based. Thus we say "Men used to think that the world was flat" "I thought you went by my house'. In the last case the word is used to describe the process by which the ground or basis for a belief is deliberately sought, and its adequacy to support the belief is examined. This process is called reflective thought and this alone is truly educative. Thus people thought the world was flat until Columbus *thought* it out to be round. The earlier thought was a belief, the later was a reasoned conclusion. Active persistent and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it, and the further conclusion to which it tends, constitutes, reflective thought. It is not merely a succession of ideas. The sequence is not merely accidental; but it is a *consequence* which is the result of selection and rejection, organised and controlled so as to lead to some definite end. It is not as if we thought of something, but the thought should inspire belief. It is not sufficient that we believe because others should believe; but we must convince ourselves of the truth, or the truth of the belief should be self-evident.

It would conduce to clearness, if we note some of the features of thought—reflective thought. There is a common element in all types of thought. Something that is observed suggests something which is not observed; and the former constitutes the ground or the basis of belief for the latter. Thus a man walking suddenly feels chill, looks up, sees clouds and t inks it is going to rain. From sight, he passes to insight. 1hat which is presented to sense, signifies, betokens, points to, tells or prognosticates, represents, stands for, implies, something which is not so presented to sense and which is believed in, because of the former. Thinking always pre-supposes some lack of adjustment, some doubt or uncertainty, some hesitation in response. Simple and familiar situations receive a response based on instinct, habit or memory. Even in new situations the response is not necessarily on the basis of thinking. Adjustment by instinct, imitation, trial and error and analogy might take place. It is only when there is something problematic that thinking arises. Thinking need not be always successful. Many men have laboured for a life time at certain problems, and because of some incorrect premises or lack of appropriate data, have gone wrong. Our knowledge of many things is incomplete, even though investigations as regards them are being carried on. There is rigorous thinking in all these cases and yet there is no result or a wrong result. Thinking is a process and cannot be described in terms of result as, for example, perception can. Thinking though a difficult process, is not given only to adults. Children under three years manifest it and it is deeply rooted in human nature. The loss of a toy or the absence of a playmate, the breaking of a cup, all start thinking. The conclusions may be incorrect, but there is the power nevertheless. Therefore we should make the most of the thought factor in childhood, if we want to promote the superior reflective power of adolescence. Thinking arises out of any attempt to adjust means to ends in a problematic situation Many different mental activities involve it. When habit fails, when the person tries for a short cut, when he seeks for an incentive to greater improvement, situations might arise which call for thinking. Apperception and assimilation mean it, studying and remembering involve it; imagining calls for it, and reasoning requires it.

There are three essentials in the thinking process, a state of doubt, organisation and conscious control of mental states in view of an end to be attained, and a critical attitude involving selection and rejection of suggestions. The "problematic situation" and feeling of inadequacy do not

mean that thinking takes place only under a pragmatic necessity. Many delight in thinking for thinking's sake, even children. These are often the intellectually minded. Something which arouses their curiosity or appeals to their love of mastery, is a sufficient problem. The thinker confronted by a situation for meeting which his present knowledge is inadequate suspends judgment and undertakes to think it out. To do this he must control his ideas and should not allow them to run away with his mind, or in other words, he should take a critical attitude. The suggestions offered should be selected or rejected, the state of doubt maintained; and systematic and protracted inquiry carried on. The end should control the selection and rejection of suggestions. This involves analysis of the suggestions and abstraction of what is relevant. We shall see all these elements functioning in thought.

Let us take three examples (1) One day a pedestrian in a city looked up at a clock and saw the time was 20 mins. after 12. That reminded him, he had an engagement to keep at a distant place at 1 o'clock. The man had taken one hour to go by the surface car and so he reasoned that he would be 20 minutes late if he took the same route. So he thought of the elevated train and the subway. He couldn't think of any elevated train station conveniently situated near the place of appointment, while the subway had one such to his knowledge and so he chose the latter (2) One day a gentleman saw near his house a large congregation of frogs. He thought it was strange and wondered if it was food that brought them there. Or was it that they were going somewhere or were awaiting rain? Some days later the same person was sitting in his house when it was falling dusk and he saw a host of insects emerging out of the earth and flying aloft The bats snatched off those in the air and frogs came out one after another to feed on those on the ground, until there was quite a number of them. So the gentleman was led to believe that the frogs must have turned out in full force on the first day also, for reasons of food. This was verified on a third occasion. A small building had been rethatched on the day and the debris was left on the ground, in which were moths and grub. In the evening once again there was a similar congregation of frogs on the spot. After reflection the gentleman recollected, that on the first occasion too, a carpenter's workshop had been dismantled and portions of the thatch had been left on the ground, where the frogs were noticed (3) In washing tumblers in hot soapsuds and in placing them downwards on

plates, bubbles appeared on the outside, and then went inside Why? Bubbles meant air and lather. Why did the air come out? Did it expand owing to heat or lack of pressure or because of both? But the air inside was already hot and so cold air must have got in when the tumblers had been taken out. This we verify by experiment. Catch some cold air in a tumbler, and on setting it down on plates bubbles appear. But take a tumbler closed by a glass slide, and set it down in the same way, no bubble appears. So the bubbles were really due to the expansion of cold air. But why did the bubbles then go inside ? The tumbler cooled. Cold contracted the air inside and outside air rushed to fill the space. This can be found out by placing a piece of ice on the top of the tumblers in which bubbles are forming on the outside and they will immediately reverse.

These three examples form a series from the more rudimentary, to the more complicated case of reflection. The first is the kind of thinking that everyone does every day, the last is possible only with people who have had a preliminary scientific training. The second is transitional. It is quite within the competence of unspecialised experience; but does not occur in the every day business of life and so has some theoretic interest. An examination of these three cases reveals five distinct stages in an act of thought 1. a felt difficulty. 2. location and definition of the difficulty, 3. suggestion of a possible solution, 4. reasoning on the bearings of the suggested solution, 5 further observation and experiment leading to the acceptance or rejection of the solution. The first two coalesce one with another. If the difficulty felt is of a sufficient definiteness, the mind immediately proceeds to the third step But when the difficuly is itself enmeshed in details, it is necessary to locate the problem. This is what the doctor does in diagnosis. The third factor is suggestion and it calls up something which is not present to the sense—the bubbles, the expansion of bodies; the frogs, the idea of food. Suggestion is the very heart of inference. It involves going from the seen to the unseen, and is therefore speculative and is at once adventurous and cautious. The suggested idea is a guess, conjecture, hypothesis, theory, The fourth step is reasoning and consists in the examination of the implications of any idea with respect to a problem. The suggestion is looked into and examined to see if it would cover all cases, and would provide a complete explanation. Only when we took the law of the expansion of bodies was it found that it solved all the outstanding problems connected with the tumblers. Reasoning shows

that if the idea is adopted certain consequences follow. It is the experiment or further observation in the final stage that brings about corroboration.

Reasoning then, is only one form of thinking; but we should also note its distinguishing marks Reasoning is the highest type of thinking and along with all that thinking calls for, includes some particular requirements. Reasoning is controlled thinking, controlled by laws and principles, and carried on by superior technique. Reasoning is distinguished from imagination, apperception and memory all of which involve thinking, in that it deals with laws and principles. Spelling and reading, require thinking but no reasoning The second essential of reasoning is the presence of a definite technique. This consists of two parts (a) it involves certain mental states. The mind should have constructive or symbolic imagery, logical concepts and explicit judgments Logical relationships are independent of accidental conditions but inherent in the association such as similarity and contrast, cause and effect, subject and object, equality, concession, etc. Logical concepts are the results of thinking whose meaning has become clear enough for a definition. A child's notion of a tree or of a chemist cannot be called a logical concept, because the particular meaning and the exact qualities necessary are lacking. Explicit judgments are those which contain within themselves reasons for the inference, e. g., Cheating is wrong. As a matter of fact, perception, apperception, conception, judgment, inference and logical thinking, are but different stages of the same fundamental process. It is, the interpretation of the new in terms of the old, the narrower experience being subsumed under the more general experience. In perception the explicit aspect of the past experience is not apparent, in apperception it has become detachable, in conception it functions consciously and in a definite form, in judgment this tendency has become more explicit, while in inference and logical thinking such past experiences are manipulated in the form of explicit judgments. Thus in deduction we bring a particular under a general and so the general must already be there. So it is such general statements as the "law of the expansion of bodies" that the pupil should know (Colvin: The *Learning Process* p. 312 read chaps, 20 & 21).

The second element in the technique is the use of the inductive or the deductive method. We shall take one example each for showing the operation of the method. The teacher takes an iron ball which

would pass through a ring. He heats the ball and it cannot pass through. The heat has expanded it. The experiment is repeated with brass, copper, lead and the result noted. All these are solids. So solids expand with heat. The teacher then takes a vessel full of water with a tight fitting cork through which passes a tube. The water is heated and it rises in the tube. The experiment is repeated with alcohol, milk etc., and we come to the conclusion that liquids expand with heat. Then we fill a bladder with air and heat it It expands and this is found to be the case with different gases, and so we come to the conclusion that gases expand with heat. But solids, liquids and gases are the three forms of matter. So we say, matter expands with heat. This is *induction.* Note how the Mendelian laws were arrived at. In *deduction* we proceed in the contrary manner. Matter expands with heat. Solids are a form of matter, and iron is a solid. So iron expands with heat. By experiment the truth of this assertion is verified. So on with liquids and gases. Induction requires a problem, search for facts to solve it, comparison, analysis, abstraction and conclusion. Deduction requires a problem, analysis and abstraction of essential elements, search for generals, comparison with each general, and conclusion. Induction establishes a general proposition, based on the evidence of particular cases. Deduction is the process of following out a general proposition into its particular applications. A sharp line has been drawn between the two; but there are innumerable resemblances. Both involve resasoning, analysis, abstraction, search and comparison. Both are present in all reasoning. Take for example the case of a man returning to his rooms only to discover everything in great confusion. At once burglary suggests itself and the alternative is the mischief of children. This is induction. Then begins deduction. The observed facts are brought under universals. If there had been burglars the silver ware would be missing. He thus applies a general principle which itself had been arrived at inductively, to particular facts. Still it is necessary to emphasise the differences. Induction is an upward movement: deduction is a downward movement. Induction leads to definition, rule, principle or theory; deduction leads to the clearer comprehension of these. Induction leads to new knowledge; deduction does not lead to new knowledge. Induction is the method of discovery; deduction that of verification and explanation.

In teaching induction is the method of education while deduction is that of instruction. Induction is slow, deduction is quicker. Induction follows a natural method, because the true order is percepts, concepts, judgments. Deduction is

not a natural method as this order is reversed. Induction is a sure method in education as it proceeds little by little, and thus makes the law. Deduction is not a sure method, because many laws cannot be understood by pupils. Induction is the method that fosters self-reliance while deduction encourges dependence on others. We have seen that both induction and deduction are involved in all thinking and the true method to follow therefore, is the way by which the mind learns, which is inductive—deductive. Therefore the true method is the psychological method or the analytic-synthetic or the inductive-deductive. To say this is one thing but to say also that we should rather use induction than deduction is not to contradict ourselves. For reasons given above the inductive method is the best in education though even in induction we cannot do without deduction (Read Horne: pp. 177—'88).

The reasons why teachers fail to stimulate thinking among pupils are many, such as poor brains, lack of knowledge due to poor memory or narrow experience, lack of habits of attention and criticism, lack of intellectual interests, and lack of initiative to do independent work due to deficient training. One of the greatest weaknesses in our schools is the dependance of both teachers and children upon text-books, laboratory manuals, lectures and the like. Pupils should come more into touch with vital activities and organise their observations. This is particularly true of Nature-Study and Geography. The teacher should provide problems which challenge their attention. Hence teachers should organise their teaching under definite topics and send their pupils to gather materials. The statement of the aim should be clear and pronounced and should almost in every case, disclose a problem. Thus in Geography pupils may think out why the largest cities are mostly situated near large bodies of water; in history pupils may be called to account for events. Opportunities should be given for free discussion. The critical attitude should be encouraged by making pupils examine their own progress, by allowing questions and freedom to express doubt. As they pass up the school they should be asked to tell how they arrived at their conclusions. Pupils should be cultivating the critical attitude by questioning themselves as to the sufficiency of their data, the extension of the application of the law, the possibility of fallacies having entered their minds. Bonser has devised a method for improving the relevancy of suggestions for the matter in hand. He gives in a card a large number of numbered reasons as to why New York has

became a larger city than Boston, and asks the pupils to place a crossmark opposite those which they think to be quite valid. They should cultivate the open mind, to base their conclusions on wide data, and to do independent work. The last consideration brings us the importance of procedure in number work which lends itself most easily for problem solving. Boys can be taught to do the mechanical calculations; but when they are given a problem they are at a loss. They "toss up" whether it is addition, subtraction, multiplication or division that is required. Teachers try to meet the difficulty, by thrashing it out beforehand in the class or by giving typical problems: pupils by getting help from their sharper classmates. In all these cases the reasoning is done by someone else; and the pupil is left only with the mechanical calculation. Again teachers are more anxious to get results than to ensure the process which is the more important part. Therefore problems should be set and the pupils allowed to attack them by themselves; even though they fail to produce the correct answers. Parents complain of the examiner who is "stumping" the pupils by setting an unusual problem. The examiner is not to blame because in problem solving what we wish to test is whether the pupil has the power to think out solutions of a problem, and so knowledge of such problems and the way to attack them is not so important as the capacity to reason about them. Therefore the teacher instead of wasting his powers in explaining how problems should be worked, should devote his energies to devising such problems as will call out the pupil's reasoning powers. He must find out problems which would be well within the compass of the knowledge of the boys. The problems should be living ones and not imaginary ones which would never have appeared in their experience. The data and the meaning of the words should be clearly laid down. Secondly the boy must be sufficiently interested in the problem to attack it with vigour. If you set him to find out the amount of wall-paper required to cover an imaginary room, he will bring to bear on it the pseudo interest of external incentives such as the desire to score marks and to stand well with the teacher; but if it were to find out the amount of lining for a box he had himself made, he would be more vitally interested. The classic example is the boy mentioned by Dr. Adams who made rapid advances in Mensuration and Chemistry, because he was interested in balloonmaking.

Three conditions generally influence thinking in schools. (1) The influence of the teacher is vital. Example is more

potent than precept, and so the mental habits and personal traits of our teachers influence us perhaps more than the instruction they give us. Imitation is but one aspect of the problem of stimulus and rèsponse. Everything that the teacher does as well as the manner in which he does it incites the child to respond in some way or another. Merely to accept without noticing, slipshod habits of speech, slovenly inferences, unimaginative and literal responses, is to endorse these tendencies and to ratify them into habits. (2) Influence of the studies. Three classes of studies might be distinguished—those which involve skill, those which involve knowledge and the disciplinary studies. The first class of studies overdoes the mechanical and so prevents thought. The second class develops information at the expense of wisdom. Information is knowledge stored up; wisdom is knowledge functioning in life. Information as such implies no special intellectual greatness : wisdom is the finest fruit of the intellect. The assumption that information once gathered independently of its use would function later in life is false. In the third class, the logical studies, this evil is greatest because these studies stand aloof from life. (3) The examination ideal with the imposition of authority and externally imposed subject matter stultifies thought. We should shake the naive dogmatism of our pupils, create intellectual unrest as did Socrates with his questions and promote a genuine love for truth, and these would react on their thinking power.

Analogy. Some recognise analogy to be one form of reasoning. This is not justifiable. In the examples given above, we heated only a few solids and came to the conclusion that all solids expand with heat. The generalisation suggested is a wild guess and no reasoning at all.. There is no ground to conclude that all solids will expand with heat. At best it can be a hypothesis or suggestion demanding further verification and proof. This is what has brought theory into undue discredit with men of the world who will rather have an ounce of fact than a ton of theory. We cannot say positively that when two things resemble one another in one or more respects, a proposition which is true of one will also be true of the other. Thus two things which in size, shape and colour look alike may not both float. To say they will, can easily be refuted : but if we knowt hey have the same specific gravity we can by reason say that they would both float. However anology will form an excellent method of teaching. It will bring the unfamiliar into line with the familiar, the unknown

into the field of the known. Thus in the nature study lesson, if we wish to teach that conglomerate is largely due to rapidly running water, sandstone to slowly moving water and shale to still water, the teacher can illustrate the theory by putting stones, sand, and fine earth into a glass bowl with water and strongly revolving it. He can then allow the mixture to settle down. The stones will settle down first, then the sand and finally the mud. This will be a good illustration of the process, but not proof of its truth. Aristotle treats Analogy as equivalent to mathematical proportion which involves the equality of ratios $a : b :: c : d$. If a: b is known, then the teacher can illustrate c: d with it. Thus a man says about the failure of a marriage contracted between a lord and his kitchen maid "you cannot make a silk purse out of a sow' s ear"; and though the two situations have very little connection, he has certainly made the one in hand clearer. This he did by drawing an analogy—"Sow's ear: Silk Purse: Kitchen maid: Noble man ' The metaphor as an analogy is a very effective way of saying a truth. It is illustrating the little known by the better known. As a method of discovery analogy is "reasoning from particular to particular' and so is not reliable. Valid analogies should have, points of resemblance which are basic, real not imaginary, and numerous and no crucial difference (Clark : Art of Straight Thinking p. 197-8). As a method in teaching, analogy is good, only we should not crack the wind of the analogy driving it so. Thus James' analogy of consciousness with a river is so far good that it suggests the movement of our mental state; but the analogy is no identity. Our thoughts do not pass through our mind once for all They can be revived which cannot be done with the water. So a metaphor should be kept within bounds and in order to do so it should be balanced with other metaphors. Thus in the case of consciousness, the comparsion to a dome, to a well, to a kaliedoscope, a blank sheet of paper, a stage, a photographer's plate, correct the onesidedness of Jame's figure and keep it to its essential point. We should also give the key to the comparison, otherwise the metaphor remains a problem. Therefore each part, the compared and the comparison should be given together and the analogy completely presented, if it is to produce the proper effect. Again the illustrandum and the illustration should be clearly mentioned—often in the order of first and second. Otherwise the pupil will not see the point in the illustration until he knows what is being illustrated. The example too is only one form of analogy, in that the particular example in one point at least, is like all the other examples of the principle which it illustrates. Often

the example is but the best concrete representation of the abstract principle, as in the cockchafer being the nearest approach to a perfect insect." (Read Adams: *Exposition and Illustration* Chap IX).

The General Nature of Knowledge

Welton: *Logical Bases of Education Chap. 1.*
Adamson: Practice of Instruction Sect. II.
Findlay: Principles of Class Teaching Chap. XII.

Teaching has a two fold aspect—on the one hand it regards the pupil, and on the other it regards the subject taught. Between these two it tries to establish the relation we call knowledge. The aim of teaching is then to lead the pupil to attain knowledge, and to develop in him the power of using and extending that knowledge. Until now we have been concerned with the process by which knowledge is gained. Now we shall take up for consideration the product itself, and concern ourselves with the real nature of knowledge, how it grows in the mind and in the race.

Knowledge is that part of human thought which is proved to be true, and human thought is proved true, only in so far as it agrees with the facts of the world. All knowledge then is a grasp at truth. We shall never know the whole truth for that is co extensive with the universe, and so is infinite and cannot be explained fully by our finite intelligence. Still it is undeniable that knowledge grows from more to more, and the bounds of superstition are correspondingly narrowed. A contrast with superstition would make the nature of knowledge clear. Though knowledge is very different from superstition, it is develcped out of the latter. In ancient days the conduct of men was mostly determined by superstition ; but as knowledge advanced, the bounds of superstition correspondingly narrowed. Even now in certain departments of life mankind is moved by superstition ; but in the majority of instances it is largely determined by thought. This is why it is said that education has dispelled darkness. Superstition is the result of man's feeling and fancy, while knowledge is the result of his thought and enquiry.

This brings us to the idea that all belief is not knowledge. Belief is unquestioning acceptance by the mind. Both knowledge and belief represent such a state of mind. The savage believes in magic as much as the civilized man believes in gravitation. Much belief is of an empty kind and

have been again and again given the lie to, when tested by experience. That it continues to be accepted by minds is because of people's mental inertia. It is only when the spirit of enquiry has been roused that people begin to question into the truth or otherwise of things and either accept or reject them. Thus though knowledge and belief are alike in being mental states of full assurance of the truth of the matter in question; only in the case of knowledge can this assurance be justified by evidence other than itself. Thus a savage believes that an earthquake is due to the anger of the gods as completely as the educated man believes that it is due to the orderly working of natural forces and laws. The educated man can prove his case, but the savage cannot show his belief to be true. (2) Many people can share a belief, but the belief is not common but individual. Each man believes for himself, but cannot communicate his belief. Thus belief is in its very essence particular. Knowledge on the other hand, is universal i.e., it is common to any number of minds. This is because it is a grasp of reality and so depends upon reality itself and not upon any individual mind. It can be communicated to all, because the evidence on which it is based can be made clear. Knowledge is something which is not merely believed in, but cannot but be believed in, because it is proved and known to be true. (3) That belief is often of the false while knowledge is of the true, shows that in many cases things which had been taken as true have been disproved later on. Thus all knowledge is belief, while not all belief is knowledge.

All knowledge starts with the spirit of enquiry. Savage man had too hard a struggle for existence to enquire into the nature of the reality that surrounded him. But even as a matter of existence, he was compelled to take notice of certain things. He ate a berry and became ill. He trod upon a stone and measured his length on the ground. If he pieced out any explanation for these, it was only by endowing things with the life which was his. When he passed out of his savagery man was not so engrossed in the quest of sustenance. He began to feel curiosity in the things that surrounded him. But he still regarded himself as the centre of the universe and material things of which he is conscious, he explains mainly in relation to himself. He doesn't think that the relations among themselves could at all be significant. This is the *fact* stage, the stage of perceptions, as Hegel denoted it. The world was regarded as a sum of things whose relations with each other were accidental. Therefore he thought that these relations could be rearranged which was the aim of magic and they were

rearranged in myth and legend and fairy tale. Primitive man had implicit faith in the efficacy of magic and its influence over the natural order of things. Magical practices such as beating the effigy of a man, to produce rain, were indulged in. Impersonal, demonstrative, enumerative, historical, singular judgments, and judgments of particular relation are appropriate to this stage.

The educational utilisation of the fact stage where magic and pseudo science rule supreme and fantasy effects the flight from reality, rests for support upon the recapitulation theory. It is contended that dramatisation, make believe, fantastic imagination and the fairy tale are suited to the child's stage of development and should therefore be given full scope in the early education of children. This view has been contradicted in the Montessori method and the whole question has become the subject of a heated controversy. Stern condemns the Montessori method as having a bias towards intellectuality in so far as sense training is stressed to the neglect of imaginative activities through speech and drawing, games with dolls and personations and songs and pictures. Others say that all human activity begins in fantasy, as play and gradually through contact with reality becomes work and leads to the development of personality. Through her didactic apparatus and the prepared environment, Montessori annuls the play fantasy of the child and thereby arrests inward development because the games of the Montessori method are not due to ends inwardly present in the child but are externally imposed.

Several reasons are brought to support the Montessori position. In the bodily economy such hormic processes as breathing and digestion were originally performed through consciousness; but when the mind was engrossed with outward happenings such processes were relegated to the care of the subconscious. Similarly the stage of fantasy belongs to the childhood of the race when the savage had no sense of cause and effect and believed events to happen as miracles through magic This savage state is transient and must be suppressed. Education should help the child to over come it. Instead of this, parents and teachers inflict the primitivism of the fairly tale on the child, forcing him to think uncausally, magically, miraculously. Psychoanalysis tells us that the child surrounded by inhibitions of time and space and the social restrictions of adults, escapes into the region of imagination where he is lord and master and where things happen not as they must, but as he wishes. If this habit persists, the child becomes unable to deal with reality and develops into a day dreamer which may ultimately lead him to

somnambulism, double personality and hysteria. Montessori's ideal is not this kind of *freedom from* this world but *freedom in* the world. Bruce (*Handicaps to Childhood* chap 8) discusses several cases in which a too great addiction to the reading of fairy tales of the blood curdling type, in childhood, had laid the seeds of the nervous disorders of adult life. He even points out that the bloodthirstiness displayed in the late war by modern civilised peoples, was due to an early education where fairy tales dealing with bloodshedding and bloodletting had a prominent part. Therefore it goes without saying that there should be a strict censorship of the kind ot fairy tale admitted to the child's reading and that the child should grow out of the "leftover' of primitive science and should early begin to take pleasure in exercising his imagination on the stern realism of mod-rn science (Rusk *Infant Education* pp 69-88).

The next stage of knowledge Hegel calls, the *Law* stage. This tries to explain the world by means of laws. Man noticed change all around him. Snow melted, the clouds ran before the wind and even the everlasting hills were not so permanent as at first they seemed to be. Rain, frost, torrent and glacier, were always at work. This change can be due only to one of two things, either to an external agency or to the inherent nature of the thing itself. At first it was thought that external causes were the sole determinants of change; but soon it was discovered that they did not explain everything. An acorn and a grain of corn could be planted together and subjected to the same external agency, but they produced very different results. An animal is less determined by external conditions than a plant, while a man is almost a self-determined being, who by his reason and will can achieve almost complete independence of his environment. Therefore innate nature is as much responsible for change as outside agency. This is what makes us believe, that every change that takes place is necessary. By interfering with external conditions we cannot prevent change. Given certain conditions certain other changes are a necessary consequence. Thus everything in nature should be explicable by its relation to other things and so nature is permeated through and through by law. In the stage of law we attempt to explain everything that forms a constituent part of reality by the relations involved. This is the scientific stage. The hypothetical judgment is appropriate to this stage.

When we go on explaining things in this manner by their relations, we are embarked upon a series of explanations which come to an end only when the whole universe is

explained. Besides, when we are explaining changes we are separating a world process which is not separate in itself. As Mach put it. "There is no cause or effect in nature; nature has but an individual existence; nature simply is." By nature is meant the universe. That cannot be explained by its relations to anything else; for there is nothing else. Thus we pass from the scientific to the philosophic stage; from the stage of law to the stage of system. As system the universe should be considered as one whole, changes in which are due to its own inherent activity. But the only self-originating activity is that of thought and will. Hence we must look for the explanation of the universe in the rational activity of an Absolute Being. We shall understand what a system is, by taking the example of a watch. The watch is a complete system and the universe in this respect, is like a watch. The works of a watch, do not constitute the watch unless they are arranged in a particular manner. That is, a watch is not a sum of its parts. The parts should be in a definite relation one with another. The meaning of each part depends upon its relations. Thus a knowledge of its relations to other parts will enable us to understand *how* the part in question does its work, or in other words, to explain its function. This is the kind of explanation appropriate to the stage of law. The inquiry as to *why* that work is done can be answered only by knowing the purpose for which the whole activity exists. This is the explanation appropriate to the stage of system. We cannot explain system because we do not know the why of it; but philosophy attempts to group all the sciences together and attempts to explain each by reference to the whole.

This sequence—thing, law, system—gives the broad outline of the development of knowledge in the history of individual minds, as well as in the history of the race. "True knowledge in the individual mind is a system whose parts or constituents stand in relationships to each other which are organic. The ideal knowledge is a complete unified system whatever falls short of system still more what is not apprehended as related to other things, is to that extent not knowledge in the stricter sense. Ideally the total operation of the individual intelligence should result in a system; in actual fact it leads to systems more or less congruent." Thus knowledge receives its capstone in system. This we shall try to prove. We have said that knowledge is of the world of reality that surrounds us. Now we are brought into contact with the world every moment through our sense-perceptions. We look and what we see is independent of our wishes; we listen and cannot help what we hear and so

on and on. Thus reality constraint us all around and we get it through our senses. We not merely get impressions; but we are capable of reviving them through our memory. Thus our past experinces are also real to us. But neither present sense experiences, nor memory of the past give us knowledge, but only material for knowledge. Even in sensation what is given to the senses has to be interpreted by thought. Thus what we *see* is an yellow sphere, but what we *know* is a lime fruit. In sense experience, memory experience and testimony, what we get has to be interpreted by thought. There is another way in which thought is directly productive. This is seen in inference. Again the gaps in our sense-experience are supplied by thought. I see a house standing but when I leave the place and return to it and see it still standing, I know that it must have been standing while I was away. This I know by pure thought independently of the senses. Thus the ultimate factor in all knowledge is thought. In every case sense impressions have to be interpreted by thought, before they can have meaning for us, and without meaning they cannot enter into knowledge. This interpretation is nothing more than the harmonising the present experience with experiences received in the past, bringing the new under the old, subsuming the narrower under the broader. That is to say, the test of truth is consistency with all other knowledge. This is why we say that our knowledge is a system tightly co-ordinated within itself and it is from this point of view that we speak of the world as mental construction Each man's idea of reality comes to him through being interpreted by his thought. This is why we speak of the knowledge in any individual mind as a system.

A	is a sensation		
B	is a sensation interpreted by A		
C	,,	,,	A+B
D	,,	,,	A+B+C
E	,,	,,	A+B+C+D

Thus all knowledge is harmonised with each other and welded one with the other. We shall take a concrete example to show the process. The growth of knowledge in all minds is uniform, in so far as there are certain universal characteristics in knowledge itself. Two men X and Y meet and have a talk let us say. X. "Do you know Quilon?' Y. "Indeed I know it well. I spent a whole summer there" and Y proceeds to describe the railway station, market, backwater, residency, beach etc. X. "Quite so you happen

to know Quilon. Do yo know Alleppey too?" Y—"No I have never stayed there. I went in after dark one day to spend an hour, on my way to Ernakulam. But I have read about it" X—"Then you *do* know something about it". Y—"If you call *that* knowledge, certainly I *do*". An analysis of the mind of Y with reference to Travancore ports brings out the following features. (1) His original sources of knowledge about these two places were based on personal observation—"sight, sound, touch, smell, taste. The second place Alleppey Y had not seen, but it is "known" because Y has a number of ideas based on sense perceptions which enabled him to interpret what he had read and what he had heard from others. This shows that all knowledge begins with the senses. (2) The primary acts of sense perception were isolated, but the mind brings all of them into relationship. He only saw the station, the backwater, the residency. All these have been grouped together by thought. Hence we are justified in saying that knowledge implies comparison, adjustment of relationship between groups of ideas. The act of thinking about Quilon seems to be simple enough, but the idea Quilon is a very complex one involving a multitude of impressions, some gained at first hand, some from conversation or reading—now here, now there—a process too extending over years. No single idea is isolated but combines with others forming complexes. (3) Knowledge is not merely of individual things but of classes of things, of different kinds and qualities. Quilon is a certain class of place, that is a port. From my acquaintance with ports, I have an abstract idea of ports having some common attributes. My knowledge of Alleppey is largely dependent upon this idea. Perhaps my knowledge of Calicut or of Negapatam or of Rangoon, which I have never seen does not go far beyond this idea. This is another kind of knowldge combining attributes and qualities and making them into a separate whole. The outward expression of this is language. Thus knowledge takes various forms percepts, concepts, judgments. (4) There is also a subjective aspect in all knowledge. Thus Y may not like Alleppey because of some unpleasant experience connected with it,, as the failure to get a conveyance in the night or he may like Kandy because of the pleasant times he spent on the lakes. (5) This difference is brought sharply into view by the use to which knowledge is put. One man uses Quilon for business, another for art, a third for social enjoyment. Thus knowledge is put to use for the attainment of other knowledge, or for practical service, immediate or remote. These are the qualities that make knowledge persist. If it has abundant relationship with

other things, if it fills a niche in advancing thought, if it is found of use, if it satisfies, it tends to persist.

Knowledge and Language.

Welton: Logical Bases of Education Chap. 3.
Lloyd Morgan: Psychology for Teachers Chap. 8.
Dewey: How we think Chaps. 9 and 13.
Adamson: Practice of Instruction Chap. 5.

Let us now briefly recapitulate how our concepts are formed. Conception is the process by which we think particulars into generals, and individuals into classes. Our experiences with one dog or with different kinds of dogs give rise to the idea or notion dog which does not stand for any particular dog, but is applicable to all dogs because it contains the common qualities of all dogs. Thus the notion dog is an idea in which all the dissimilarities of dogs have been eliminated, but the similarities have been perceived and brought together. Thus many particular dogs—Dot, Jet, Jack, Lion, Carlo, Spot—have been thought into the general idea "dog". This is no image. When we say the word "dog" an image may rise in the mind, but it is not necessary, that our idea should correspond to such an image. Indeed there are cases in which there could be no such image at all. Thus we can image an object before it is acted on by a force and after. That is we can image the results of the force and not the force itself. We can think of the force but not image it. To have an idea therefore, is not to look at an object either in reality or as represented in a mental image, but to think it. An idea therefore is purely a mental construction, and our grasp at reality is carried in the mind in the form of ideas.

We know that all knowledge consists in correctly interpreting or giving a meaning to experience "Sense-experience cannot be knowledge; though it presents us with the raw material from which knowledge might be elaborated; perception by itself is not knowledge, for knowledge involves the generalisation of particulars, the importing into them of general meaning". This we have said means nothing more than the harmonising present experience with our past, bringing in the new under the old. Just now we saw that all our past experiences are stored in the mind as ideas. Therefore interpretation means the bringing in of the new experience under some one or other of the ideas in the mind.

These "ideas" which are so important in the development of knowledge can easily be represented by some sign,

Any such system of signs is a language. The effect of such a system of signs is two fold. It promotes thinking and it helps communication. The more easily these ideas enter into relations one with the other the more facility does it give to thought; and the system of signs having been agreed upon, communication is rendered possible because the reference to reality is standardised. There have been three schools of thought as to the relation between thought and language:—that they are identical, that language is the garb of thought and that while language is not thought, it is necessary for thinking as well as for communication. But here language should be taken as including gestures, pictures monuments, visual images finger movements etc. Of all systems of signs verbal language is the best. Natural objects have been used as signs. Thus clouds are said, to signify rain, foot-print, game or an enemy, a projecting rock, minerals. But in these cases (1) the physical existence tends to distract attention from the abstract meaning. That is, we are apt to take the sign literally rather than to find out what it signifies. It is a common experience that if you point out something to a dog with your finger, he would look at the finger and not at what you are pointing at. (2) Natural signs are not so conveniently produced as words. (3) They are bulky, cumbrous, inconvenient. Gestures have some disadvantages. Thus certain savages whose language is so ill-developed that they have to eke it out with gestures, find it impossible to communicate with each other in the dark, where the gestures cannot be seen. Gestures share with visual images the defect that they can only represent the outward and visible qualities which are frequently far from being the most important. Gestures are also frequently doubtful in their reference. Thus flapping of the arms may represent a bird or the act of flying. With a language of gestures therefore, thought can advance but a little even in the stage of sense-perception.

Speech is free from many of these disadvantages. It can easily be produced. It can be used as a medium of communication, in the dark as well as in the light and between persons at some distance from each other. Owing to their artificial character linguistic symbols can bear a very highly abstract meaning. They are compact and easily manipulated. The usefulness of this system of words is indefinitely extended with the invention of writing. It enables contact with many minds in the present and in the past. It is mainly in the written form that knowledge of the individual contributes to knowledge of the race and is checked and corrected by it. Individual experiences vary and the truth

is obtained only by comparing the experiences of various people. This is rendered possible by written language. A verbal sign (a) selects and detaches a meaning from what is otherwise a vague flux and blur. Meanings which are vague aud elusive get fixed and settled when a name is given to them. Thus things round about us might be full of suggestions for us when they are named, and their meanings become definite. Children learn up these names glibly, and they in turn become concrete individuals to them. Abstract concepts like goodness, beauty and justice get a local habitation in this manner (b) A sign preserves a meaning. The thing may come and go; but a meaning fixed by linguistic signs is preserved for future use. If the thing is not present the word can still evoke the meaning. Thus though the dodo is extinct we have a notion as to what it was. (c) The sign can be transferred from one context to another and can be used for judgement and inference. As Spearman says language pours our concepts like molten bullion into coining-moulds from which they issue as legal tender, capable of being used for many transactions. Hence language becomes a tool of thought.

Language makes instruction possible. Even though the child's knowledge of a flower is not as full as that of the scientist's, since the two refer to the same reality, it is possible for the latter to instruct the former. This is done by the scientist using words which call up definite ideas to the mind. In the same manner it would be possible to teach the child about parts of reality he had never experienced. Thus we can make him understand quick-silver by the mere agency and medium of words, even if he had never seen the metal. We say it is bright as pewter, liquid like water, heavier than lead, and reflects light like silver. These ideas he might synthetise and construct an idea of quick-silver which will be more or less accurate. Such indirect knowledge ulimately rests upon direct knowledge. It is therefore necessary that children's ideas should first be obtained by direct contact with things This is the foundation of that thorough command over language without which all mental work is impossible.

Communication of thought and language depends upon the existence of corresponding ideas. This means that the ideas should refer to the same reality, and give it the same meaning. Different people have different ideas because they arise from different experiences. How these meanings get started is a mystery. The child's mind is a big,

booming, buzzing confusion. This is equally true of an adult in a new environment. He is like a cat in a strange garret. Thus to a stranger all the sheep in a flock look exactly alike, but to the shepherd each sheep is individualised. That is, each comes to have a separate meaning for him according to his dealings with it. This is how the world in which we live comes to have meaning for us. Meanings are primarily acquired by activities. By rolling roundness is appreciated. By similar reactions qualities are found out. In this way concept-building goes on until our ideas are ticketed with a word. The meaning of each word therefore depends upon the amount of experience that each person has had with the thing it signifies. No wonder therefore, if meanings differed with different people. Again meaning is partly determined by context. We have already said that the beginnings of language are not to be sought in isolated words but in actual speech. Mankind spoke first and then analysed its contents. Speech is required for practical purposes and to effect its aim, it had to be in complete sentences not in isolated words. Speech should fulfil the work for which it exists. It must result in action. If the function is performed, the object of the speech is satisfied. Therefore the sentence is the true unit of experience. Thus the sentence "the ground is covered with grass," expresses a single and undivided fact of experience. If we use an isolated word we take it either to be an abbreviated sentence, or we are perplexed as to its meaning. This shows that the meanings of words are partly determined by their context. Thus "bright' has a different meaning when associated with "day" and when associated with "boy" Even sentences do not stand alone. Their meanings are determined by the topics in describing which they form a part. This is why no confusion is caused even though certain verbal signs have more than one meaning. Thus "page" may either refer to a boy or to a book, and we do not confuse the two meanings. Each word has therefore a specific meaning which varies with the context in which it is used. Still there is nothing radically different in these several meanings, but something very much in common. This common element which forms the bond of connection with the separate elements, is known as the general meaning, and when explicitly stated, is called the definition of the word. (Adams: *Herbartian Psychology Chap. VII.*). Therefore the fact that we know the general meaning is not sufficient guarantee that we shall use the words correctly in particular contexts. This is why learning the definitions of words, has been discouraged by modern educational theory

and usage has been emphasised. This is the principle on which Murray's Dictionary has been composed and its abridgement the "Concise Oxford".

This flexibility in meaning is a great advantage, as it enables us to express the finest shades of thought with a comparatively limited vocabulary. But it has its disadvantages also, the chief of them being, that it gives rise to ambiguities. Ambiguities are of two kinds—uncertainty as to the sense in which a particular word is used, or to faulty construction of a sentence. Uncertainty in the meaning of a word arises from the fact that words change in meanings as time goes on e.g., "natural" "idiot" "publication." This tendency has been greatly curtailed by the introduction of printing. But ambiguity arises chiefly from uncertainty as to which one of various possible current meanings is applicable in the context. Technical use of words increases the chances of such confusion. Examples are. "The Reformation of Luther", "Teeth extracted with great pains". "The bank is well-guarded. Officials are specially employed to watch all official transactions from places where they are not seen". Misconceptions as to the meaning of words arise also out of faulty construction of sentences, e.g., "Why go elsewhere to be cheated. Come in here". Another evil in language is that it tends to arrest personal enquiry. We spoke before of preformed judgments. Every generation absorbs a large number of these ready-made judgments. The ideas of others, take the place of our own ideas. We obey authority instead of coming to depend upon our own personal inquiry. This evil arises out of the defective way in which our meanings are built up. We have said that meanings arise out of direct experience. Words only represent these experiences and are symbols only by virtue of what they suggest. "Words are wisemen's counters, but they are the money of fools" (Hobbes). To borrow catchwords and cant is not to know their real signification. This is why educationists of all times have spoken of things before words. Another evil is, that language from being necessary for thought, has done its work so well, that it has come to stop all thinking. A word is an instrument for thinking about the meaning; but we have come to use words so often as counters and tokens that they have now come to be substitute signs and prevent us from thinking at all about their meanings. The pupil's attitude becomes mechanical instead of being thoughtful. This is the danger of verbalism and has given rise to the saying that words were given to conceal our thoughts instead of revealing them. A book like Bishop Trench "Study of Words" will convince us how little we

think about the meaning of words. Finally the fact that words might carry different connotation with different people, makes it necessary for the teacher to see, that what he says has been properly understood in the sense in which he meant it. This he can find out by question and answer. If he does not take care in this respect, he will leave misapprehension in the minds of pupils. Their idea of the thing would not correspond with their meaning of the word. Thus the way is left open for verbal misunderstandings. This is the basis of pupil "howlers". In the course of a lesson on first aid a pupil got the notion that artificial respiration was artificial perspiration. As regards language the teacher's duty is threefold (1) the enlargement of the pupil's vocabulary. Everybody has three different kinds of vocabularies—a reading, speaking and a writing vocabulary. The first contains more words than the second; and the second more than the third. Words from the first filter into the second and third. (Adams: *Student's Guide* p. 168). A person's vocabulary is extended by contact with men and things and with books. A limited vocabulary carries with it the penalty of looseness of thinking. Such a person is averse to clear discriminations. He is not full of the most excellent differences, but is for ever saying "what is that thingummy bob" or "what do you call it". Enlargement of the pupil's vocabularies requires enlargement of the pupil's environment, for an active command of language is obtained only by enlarging the pupil's sphere of activities. (2) The teacher must create accuracy of the vocabulary. Words, we have said, have a generic and a specific meaning. They change their meanings through history and according as they are used in technical contexts. The teacher must make these differences plain and thus prevent confusion. He must always work over from one to the other. Take for example the word "rise". "I rise from my seat". "He rose from small beginnings". "The balloon rises in the air". "He rose in the estimation of his fellows". "The yeast rises". "To take a rise out of me". The teachers should show how the one meaning developed into the other. (3) The teacher must train his pupils in consecutive discourse. Only by this can they understand the meaning of words as that is partly dependent on the context. This is why we should insist on answers in complete sentences. The justification for consecutive speech also stands on the same grounds. The teacher can help this by not monopolising all talk to himself, by not questioning too minutely and analytically, by not assigning too short portions where the thought is not complete, and by not interrupting pupils' utterances for the correction of errors.

Definition, Classification, Explanation.

Welton : Logical Bases of Education pp. 220--245.
,, : Psychology and Education pp. 311--12, 407-9.
Adams : Herbartian Psychology Chap. 7.
Lloyd Morgan : Psychology for Teachers Chaps. 5 & 6.
Jones : Principles of Education pp. 212-223.
Russell : Logic from the Standpoint of Education Chap. 4.

The ultimate aim of all knowledge is to explain the experiences of humanity. To know is to be able to explain. The ideal explanation will be that which would shew the place and function of anything in the system of the universe. This involves a knowledge of the nature of the thing to be explained, that is of its definition, and of its relation to other things, that is of its classification. Since our explanations are limited to that within a system, definition implies the Fact Stage; and classification the Law Stage. There has been both classification and definition of a rudimentary type from very early times. The very fact that there are names of things implies that these things have been gathered into groups or in other words there is classification implied in names. Such general names imply that the grouping was based on the recognition of common qualities and the name implies that in any one particular case in which the name was applied, there were these common qualities. That is to say, the rudimentary classification carried with it a rudimentary definition; for definition is merely the explicit statement of the common qualities that determined the classification.

Definition is an expression of general meaning; but it does not include all that general meaning. A definition has to be very brief, and the common qualities which it states within its compass are very often in the nature of *properties*, that is they are derivable from other qualities. Thus a right-angled triangle has the qualities of inscribability within a semi-circle and of having the square of the hypotenuse equal to the sum of the squares on the other two sides. However, these two qualities can be deductively derived from the fact of the right angles. Hence it is not necessary to mention them in the definition. The definition would also omit the *accidental* qualities. These are common to any number, but are not essential. Thus some swans are black; but blackness is not an essential quality of a swan. Therefore there is no need to separate them from all other swans and to include colour in the definition. In many cases the choice of properties to be mentioned is purely arbitrary.

Thus equilateral triangles are also equiangular, and it is left to us to emphasise either the equality of the angles or the equality of the sides. This more or less arbitrarily chosen group of meanings is technically called the *connotation* of the word. It enumerates what we consider to be the important attributes for our purpose. Hence the importance is relative —relative to some theory. This shows that with advancing knowledge or with a new theory, the definition might change as the order of importance of the attributes would vary. This is what happened after the formulation of the doctrine of evolution. Hence there could be no finality about a definition.

Definition is only one way of stating meaning. It is the most precise way and the most important way as considered by learned men. In ordinary life things are not defined so exactly. Words for example change their meanings with their context and yet we have said that over and above these 'specific meanings' there is a nucleus common to all these several meanings, and that this core is known as the general meaning and that when stated explicitly is known as the definition of the word. But definition is the mark of the highest type of scientific mind. In ordinary minds the meanings of particular things are largely connected with the particular examples, or what is technically called their *denotations*. Thus when a child is asked what a dog is, it would probably show a dog or name a dog. For ordinary purposes the word suffices. We do not make conscious its connotation or statement of common qualities. This happens only when a person forgets a word. Then he makes explicit the meaning which is in the mind. Once a cat drank all the milk there was for the sahib's tea and the butler therefore brought only a meagre supply. The sahib grew angry and the frightened butler forgot the word for cat and he relapsed into description, "one tail, four legs and mia mia". A professor's wife lay in labour pains downstairs, while he was reading upstairs. When the child was born, the nurse come to the professor's room and joyfully announced. "It is a boy, sir". The professor absent mindedly lifted his head and asked "What is a boy?" The nurse was shocked and grieved but she did her best and said, "a little man sir". The professor replied "a boy did you say. Ask him to go away. I cannot see him. I am very busy". To many the meaning of a word is bound up with what we can do with it. Thus a chair is to sit on, a pencil is to write with, a string is something with which to tie parcels. So long as these satisfy our practical needs we do not carry our inquiries further. Thus it comes about that we understand many words which yet we

cannot define(Read Adams, *Herbartian Psychology* Chap. 6). Ask the pupils of your class to define the world "no''. It is not likly that you will get the correct answer. Some actual definitions obtained from a class of boys are as follows:— ":Not to do it". "None of it'. "You won't give me leave". "Less than one'. All these except the last which is the work of a clever little arithmetician, show that they know when to use the word and yet that they could not define it. This is because they have not analysed their knowledge closely, or do not know what is conventionally regarded as the definition. This ought to tell us that the place of definition is at the end of education and not at the beginning. It is easier to pass from knowledge to definition than from definition to knowledge.

Definition is beyond the capacities of little children. It is a matter of the imagination and depends upon the power to isolate the abstract from the concrete. This can be made possible in their case by using ample material. We have said that a definition is a purely arbitrary grouping of common attributes. It is an abstraction which exists ouly in the imagination. You cannot meet with it in common life except in association with one or other of the varying elements. Therefore the way to teach a definition to the pupils is the way in which the definition itself had been built up, that is by the law of Concomitant Variation which may be described as follows:—If a given element of experience is associated at various times with various elements of experience unlike each other, the tendency towards the recall of any one of these various elements, is checked by a similar tendency in favour of each of the others, so that the one permanent element will be set free from its varying concomitants. Let us take an example and see how the definition of a rectangle is built up. Let the teacher first present a rectangle of white pasteboard 4×3 in. The child will note:—

plane surface	opposite sides parallel
pasteboard	four right angles
four sides	size 4×3 inchess.

Next another of ordinary paper:—

plane surface	opposite sides parallel
Ordinary paper	four right angles
four sides	size 4×5 inches.

The resulting idea in the mind will be plane surface, opposite sides parallel and four right angles. Present a third

of yellow wood 12×2 inches, a fourth of blue cloth 7×6 inches; and a fifth of black sheet iron 9×12 inches. The essential and permanent features will tend to impress themselves deeply in the mind, while the varying elements will fall away. Thus with wider and wider experience the child comes to describe the essential elements as permanent and retains them as the definition of a rectangle. This example should show that a definition is purely abstract and exists only in the imagination and that so soon as it takes a concrete shape one or other varying element makes its appearance as wood, pasteboard, paper, cloth, or sheet iron in the present example. The child which is devoid of the wide experience that is required to isolate the abstract from the concrete, is not therefore capable of giving a definition. This tells us not to give too great an importance to any one fact. A teacher in the course of a lesson on the Singalese said that among them there was no difference between men and women in outward appearance. This made a vivid impression on the boys' minds. In the recapitulation stage, to the question, "what is the especial characteristic of the Singalese?" he got the answer. "There is no difference between men and women".

A definition is a purely artificial skeleton of meaning, and not the real tissue of meaning, which alone can function in the soul. We find it convenient to express the most essential marks of a general idea in words and we call the statement a definition. But a definition can only state qualties which are found in every instance of the general term. So any quality in which a variation is found should be excluded e. g., as all tables are not square, square or even the shape could not form part of the definition of a table though the shape is an important feature in a table. This means the more variations we know, the more meagre and attenuated becomes our definition, and at the same time the fuller the implicit meaning. In short the definition is like a word, a mere sign and can summon different amounts of meaning in different minds, according as they have reached by analysis the elements which are combined in that definition.The more knowledge they have of the defined, the more the meaning. Therefore to know the definition of a thing, is not to know about it; and it is folly to teach definition and to imagine we are te iching real knowledge. This is why the older methods of teaching Grammar and Geography have been condemned. We should also condemn the practice of teaching word meanings out of a dictionary The meaning of a word is impressed upon our minds, by coming across it in various contexts, but not by referring to its

meaning in a dictionary. Thus a child might pass to an intelligent definition of a word after using it in various contexts easily and naturally, but to pass from the definition of a word to the intelligent use of it in different contexts is not so easy. Finally the search for a definition is often more valuable than the definition itself when found, as it would have clarified our views.

Let us examine a few definitions with a view to find out, what the rules and what the marks, of a good definition are

Name	*Class*	*Distinguishing feature.*
1. A Quadrilateral	is a plane figure	having four sides
2. A Parallelogram	is a quadrilateral	whose opposite sides are parallel
3. A Rectangle	is a parallelogram	whose angles are right angles
4. A Square	is a rectangle	whose sides are equal
5. A Square	is a parallelogram	having equal sides and right angles
6. A Square	is a quadrilateral	with equal sides, opposite sides parallel and angles right angles.

It may be noted that in each one of these definitions we have first named the thing to be defined, next we have classified it, and lastly we have distinguished it from others of its class. The teacher will find this definition of a definition, a useful guide in teaching pupils to define and to judge the sufficiency or otherwise of other definitions. Thus the definition "the subject of a sentence is that of which something is said" is wrong, for in the example, "the cork is light,' the cork cannot be the subject because it is only a word and so the definition should have said "the subject of a sentence is a word etc", So it classifies wrongly. (2) A definition should include only such qualities as are common to all of the same class. Thus we cannot define a triangle "as a three-sided figure made of *wood*." (3) As regards expression in definition our aim should be definiteness and precision (*a*) it should not be mere tautology. Thus 'posteriors' is not a good definition of 'ischial tuberosities'. It is only to give it another name, albeit a more familiar one (*b*) it should be clear and not couched in vague language such as Dr. Johnson's definition of a network (*c*) it should not be merely negative, only

indicating what a thing is not. Euclid's definition of a point errs in this respect. But a negative idea like "alien" might be negatively defined.

Classification and definition exist together. Classification is a mental organisation of experiences on the basis of recognised resemblances and differences. Hence it implies definition. It includes first the grouping of particular things, or a number of objects under a term eg. "rose" and secondly the grouping of classes of things as "rose" under "flower". Classification is a thing of the mind, a purely mental act. "We find it necessary for our human needs to classify objects but this is for our convenience and is not at all binding upon nature". For example, the regional classification in Geography, does not represent the actual divisions of the earth. Our carefully prepared classifications do not often fit into nature as in the case of the duck-bill or platypus. It is obvious that each particular thing can be thought of under many classes; each one of the qualities serving as a basis of classification. Thus all things could be classified on the basis of colour; but we try to classify things so that the classification may prove of the greatest use in the search for truth. Botany and Zoology are largely classificatory sciences which arrive at truth by the device of classification. (1) This classification should be exhaustive of its denotation. That is we should confine ourselves to one basis at a time. Let us take symbols. If we have a class G which exhibits a quality D throughout, but in varying forms as $d_1 \ldots d_n$, we may make D the principle on which we divide the wider class or Genus G into the sub-classes or species $S, S \cdots S_n$.

G (D)

S_1	S_2	S_3	S_n
(Gd_1)	(Gd_2)	(Gd_3)	(Gd_n)

The classification will be correct if $S_1\ S_2 \cdots S_n = G.D$ cannot be included in the definition of G because it is not common to all its members, d_1, $d_2 \ldots d_n$ forming the *difference*. For defining S therefore, we mention the genus and the particular difference i. e., $S = Gd$. This as we have seen, is the process by which we have defined:—naming a thing, assigning its class and distinguishing it from those of its class,

Plane Triangles (D=sides)

Equilateral	Isosceles	Scalene

Here D is the mutual relation of the sides. In the same way a classification can be made on the basis of angles. We

should not mix up the bases. This is the mistake in the classification of Nouns into Proper, Common and Abstract. There are two bases here. The classification of sentences into Principal, Simple and Subordinate, makes a similar mistake. Simple and Complex are genus, while Principal and Subordinate are parts and not species.

In the examples we have given, we have tried to be exhaustive on a particular basis. This kind of classification might be called Disjunctive classification, for its object is exhaustive enumeration on a particular basis. It is the kind of classification appropriate to the Thing stage of sense preception, which assumes that each thing is independent of the other. When we find that things are not so unrelated and that one thing causes another a new principle begins to operate in classification, and it is called Subsumptive classification. This has been most marked with the coming of Evolution. Everything has been arranged in a hierarchy of classes on the geneological principle. Thus species, languages and strata, have been arranged in this manner in causal series. Our knowledge not being final our classification too, should be changing.

Explanation. An experience can be described but it has also to be explained. One answers the question "How"? the other answers the question "Why". We may describe the commercial greatness of London and we may explain why she should be so great. It is important that the teacher should clearly grasp the distinction between the two. It is one of the distinguishing features of good method in exposition, that description should be kept apart from explanation. The object of definition and classification is only to describe. They give no reason why the differences and resemblances perceived in nature should exist. That is the function of explanation. Both description and explanation presuppose some one for whose sake we describe and explain. There is a giver and a receiver. Hence we should settle upon the apt correlative words for the receiving. In the case of description, it is 'apprehension', in that of explanation 'comprehension'. Both description and explanation involve analysis. In both description and explanation we are dealing with relations; but in one the relation is particular, in the other it is general. In fact the essence of explanation consists in the reference of a particular to a general. Thus if a child asks "why a cork floats" and I say "because it is on the top of the water," I am only describing it in other words Even if I say that it floats because "it is lighter than water",

it is still only a particular relation. In order to be an adequate explanation it should refer the phenomenon to certain innate characteristics or properties of bodies by means of which, when free to move they arrange themselves in accordance with the earth's attraction. This is a logical relation. In the same way, the fall of an apple can be explained only with reference to the principles of gravitation. Such an explanation would be valid even though not final and ultimate; for which we should still be able to answer the question "why does the earth attract the stone?" That is an ultimate explanation beyond our reach. We should stop at the universe which is its own explanation.

Explanation and Exposition are often confused. Scientific explanation forms the data for the teacher's exposition. The teacher's exposition may be excellent without his explanation being correct. The latter only consists in producing in the hearer's mind the same arrangement of ideas that exists in his own. Some think that explanation is unnecessary. You may state and demonstrate and leave the explanation out. As Jacotat put it, a teacher who expl ins is deadening Montaigne complained that teachers thundered eternally in pupil's ears, leaving them no time to think and to understand. This is what the little girl meant who said that she could understand Arithmetic if only her mamma would give up explaining it. Ruskin said "explanations are wasted time. A man who can see understands a touch, a man who cannot, misunderstands an oration." Often it is found that only a word is needed to explain. Thackeray tells the story of an abbe who while waiting along with others in the antechamber of a nobleman enlivened his companions with his experiences. He told them that his first penitent was a nobleman who had committed a murder. Soon after, the count came out and hailing the abbe said that he was the abbe's first penitent. Again Lange in his book on Apperception mentions the case of Ibyacus a poet of Attica who while travelling was set upon by thieves and killed. As he lay dying he saw a flock of cranes in the air and said "Ye cranes bear witness unto my death." The robbers went into a city and attended a theatre. In the middle of the play one of them looked up and saw the cranes in the sky and he cried out "look, the cranes of Ibyacus." The suspicions of those who were around were aroused and the culprits were brought to book. In both these cases only a word was necessary to give comprehension. Hence the true function of explanation is to reproduce in the pupil mind the relation among a group of ideas that would make the experience to be understood.

The Feelings

Woodburne: Human Nature and Education Chap. 4.
Dexter and Garlick: Psychology in the Classroom Chaps. 15, 16: 17.
Dumville: Fundamentals of Psychology Chap 11
Horne: Psychological Principles, pp. 193-225
Betts: The Mind and its Education Chaps. 16 and 17.

We shall now take up the second or affective phase of mental life. In characterising the mental processes as three fold, we do not intend to indicate that these functions take place separately. What we mean is that we cannot resolve anyone of these elements into either of the others. We have already sufficiently demonstrated that every kind of mental phenomenon is a composite of these three aspects. Feeling especially is always found associated with other kinds of mental phenomena. It is not a "thing-in-itself" capable of having a separate existence and so it is very difficult to define. Popularly various meanings have been attached to it; but scientifically it is nothing more than the attitude of consciousness towards thought and action. Every thought and action has its feeling attributes; and in the ultimate analysis these feeling tones of consciousness are found to be either agreeable or disagreeable. Pain and pleasure therefore, are spoken of as the elementary feelings, because they could not be analysed still further into simpler elements. We should distinguish pain in this sense from physical pain which is a sensation and as such presentative, due to the physical stimulus of a physiological sense organ. Pain as a feeling arises out of a certian attitude of consciousness,and so is largely ideational Then there are the complex feelings or the emotions, so called because they are complicated with sensations, ideas, images and tendencies to action. We can divide these still further into the Coarser and the Finer Emotions, according as the bodily expression is prominent or not. Examples of the Coarser Emotion are fear, anger, hate, joy, grief, jealousy, love; and of the Finer Emotions are self-respect, sympathy, wonder. The main characteristics of emotions are six in number. (1) A characteristic bodily expression. Thus we are red with anger, bent with grief, rigid with fear. (2) It appears in all ages. Fear and anger are with us from the cradle to the grave. (3) They have a wide range and are easily aroused. They are aroused by a variety of causes. (4) When once aroused they persist (5) They interfere with our judgement as they master us and refuse to be used for our purposes. (6) They could be easily

conditioned, that is transferred to other objects and situations (Sandiford : Chap. 7).

The feelings play a very important part in the life of man. Some have suggested that they are biologically the earliest to develop. Even if we do not accept this view, we should concede that it is always present in consciousness and gives the proper value, importance and worth to our experiences. They are the main, if not the only agency, in producing Art and Religion. Thought directs, the will carries out, but the great dynamic which supplies the energy is feeling. All the great philosophers have observed the great part played by sentiment in human life which is greater even than thought and will. These considerations impose upon us the necessity for cultivating the feelings. We also note that the character of the feelings changes with the growing child. In childhood the feelings centre about the self; in early adolescence about other selves; in late adolescence and maturity about certain ideals. Hence the succession the Egoistic, the Altruistic and the Idealistic feelings. In childhood the most prominent emotions are the love of self, of pleasure, of approbation and of possession, pride, vanity, fear, anger, joy and grief. These are the first to be developed because they spring from the instinct of self preservation and growth. They are concerned with pleasure and pains, the wants, desires and general well being of the individual. They are anti-social in so far as they insist on selfness. Our great object should be to prevent them developing into selfishness, by securing the transition to the Altruistic feelings of the next stage. Youth is governed by the Altruistic feelings which attach to other selves as their objects. They are love and hate, friendship, respect, sympathy, emulation, patriotism. As the individual comes more and more into contact with society, he becomes alive to the wants of others and the egoism of childhood comes gradually to be overlaid with the altruism of youth. As the youth advances to adolescence, the feelings become attached to certain ideals as their objects. The ideals of man are threefold truth, beauty and goodness, corresponding to which there are the three ideal feelings or sentiments, the intellectual including ignorance, wonder, curiosity, interest, surprise and the love of truth; the aesthetic consisting of the sense of the beautiful, of the sublime and of the ridiculous, and the ethical feeling relating to the good and the evil. These three stages are not mutually exclusive but the personality of the child becomes wider as it grows and takes to itself the altruistic and the idealistic feelings on the substructure of the egoistic. Moreover our feelings are very. important so far as character is concerned. Mood is nothing

more than the sum total of our feeling tones. Our mood colours all our thoughts judgments and decisions. A dyspeptic is a pessimist while an optimist is one who enjoys good health and has a bright mood. The student who attacks his work in a despondent mood can never succeed like the one who takes it up in a spirit of confidence. The sum total of our moods is known as disposition which is pleasant cheerful or gloomy according to our moods. Temperaments are predispositions which are largely determined by the organisation of our nervous system. Moods, disposition and temperaments form component parts of character.

The education of the feelings is beset with difficulties. We can never reach a feeling directly but only through the idea on which it is based or through its outward manifestation or action. For example we can arouse the altruistic feelings in the child only by suggesting the ideas on which they are based and by insisting on conduct which means regard for others This shows that the education of the feelings is not separate from the education of the intellect or of the will but can be achieved only through it. Feeling can be educated only by its right expression and not by hearing about it. Therefore there must be learning by doing. Again we should be careful not to promote over-emotionalism which confuses clear thinking and reasoned behaviour. We should therefore develop and maintain a just proportion between knowing, feeling, and willing.

The pleasure-pain principle is of the greatest importance in education, as will easily be seen when it is known to be at the basis of the system of rewards and punishments. The older educational ideas looked upon the school as a place of penance where both the subjects taught and the discipline prevalent were arranged to make the boy's life miserable. It was thought that a certain amount of disagreeable work was essential for children, to give them an element of character otherwise unattainable. It is true that the child should face and surmount difficult tasks if he should develop normally and so he should not be always kept at "soft options". This does not mean that the schoolwork should be disagreeable. Pain shows that all is not well with the organism, while pleasure is an indication that the organism finds the experience satisfying and conducive to its welfare. As Bain says states of pleasure are concomitant with an increase, and states of pain with an abatement of some or all of the vital functions. Hence the

modern ideal of making the school a place of pleasure is psychologically justifiable. The pleasure-pain principle is invaluable for moral education. We are all subject to the Law of Hedonic Selection, by which we seek pleasure and avoid pain. So that if a desirable reaction is associated with pleasure it tends to be repeated, and if an un-desirable reaction is associated with pain it tends to be repressed. It is the task of education so to link up pain with wrong doing and pleasure with the right that the organism will instinctvely do the right and avoid the wrong. The animal trainer gives a lump ot sugar to the horse that has performed a desired feat so as to associate pleasure with its performance and to ensure its repetition- The parent flogs a child which has done wrong, or takes other means of repressing an undesirable characteristic. The child takes delight in sucking his thumb and the parent wants to break him of this habit. He may tie up the thumb behind his back, so that he cannot take it to his mouth. But this will interfere with the freedom of bodily movements. He may therefore smear mustard on the thumb so that every time the child sucks he gets a disagreeable taste. As a result the thumb sucking tendency is inhibited. This is the fashion in which a system of rewards and punishments works. It is not always effective however. When the child is grown up, he will easily trace the disagreeableness not to the thumb, but to the mustard. The tendency to suck still remains though held in check. If a boy is rewarded for being kind to his sister, he comes to look upon his kindness as a means to get the reward. If the reward is discontinued, so will the kindness stop except in so far as it had awakened an inborn tendency or become fixed by exercise. So the punishment can only prevent the wrong doing, it cannot create the right feeling. With all that we cannot do without punishments altogether as they are the only means by which we can eradicate evil qualities which have to be done away with at all costs.

The Coarser Emotions such as anger, hate, grief, are instinctive in origin and are embedded in the nervous system awaiting the stimulus to bud forth, and the problem is not how to arouse them but how to control them. We have seen that bodily expressions play a great part in these emotions and the determination of this part has given rise to the Lange-James theory which says that the bodily expressions are not the result but the cause of the emotion. That is we laugh and we are pleased; we cry and we are grieved; not that we are pleased and so laugh, or grieve and so cry. This theory cannot be accepted without reservation. It is not the physiological expression alone

that causes the emotion, the idea contributes a great deal, otherwise why should certain ideas alone cause the emotion and not others. Thus the tiger arouses fear in us because of the associated core of ideas of fierceness. A small child in whom there is no such association may be attracted by the stripes instead of being repelled. If the theory were true different bodily expressions should give rise to different emotions, but we know weeping and laughter may be caused by joy; and that tears may mean either joy or grief. In the case of the digestive organs, the greater the pleasure in the food, the greater is the secretion of digestive juices, Hence the pleasure preceded and caused the secretion. But there is also an element of truth in the theory in so far as when once the emotion is started it is fed and accentuated by the outward bodily manifestations. The boy sees the bear, is frightened, begins to run and becomes more frightened. Hence the way of control is plain. Control the idea, redirect the attention, forget the idea, put it aside, think of some thing else and the emotion fades away. Think of it, brood on it and you feed it and make it grow. The bodily expression so far as it is created by the voluntary muscles, is also amenable to control. The truth of the Lange-James theory tells us that if we yield to the bodily expression and assist it, the emotion will remain; but if we check it and oppose it, the emotion will disappear. An emotion should be controlled in the beginning or not at all. We should not allow ourselves to be carried away by our emotion, but we should bring it under the control of our intellect. Take time to think, count ten before you act on your emotion. A notoriously pacificist school master was called upon to inflict corporal punishment for the first and only time in his life. To screw up his courage to the sticking point, he made a speech, worked himself up into a fury and started to castigate. The event proved that he had greatly exceeded his intention (Adams: *Everyman's Psychology* p. 376).

As we have to control our coarser emotions, so have we to develop the social or altruistic emotion. Altruism was brought into prominence by Comte's religion of humanity. Though it recieved a check in the Gospel of Power as preached by Nietzche and Shaw, evolution came to its help and showed that even in the grim struggle for survival, mutual help counted for a great deal. Man does not progress by selfishness alone; and so we should supplement the egoism of childhood with the altruism of youth. This we can do by giving the altruistic feeling exercise. Let boys sympathise

with real cases. Show that society depends upon mutual self.help and speak to them about thə Fatherhood of God and the Brotherhood of man. Develop the imagination which gives the sympathetic insight into distant times and places. Utilise the every day occurrences of the day, a flood a pestilence or a famine for exercising the altruism of the pupils.

It may be well to distinguish among emotions, sentiments and passions. Emotions are transient, occurring at particular moments under particular circumstances. An emotion may become chronic and may develop into a deep-seated tendency to act in a particular way in relation to our physical and social environment. Then it is called a *passion.* A man may be liable to yield to his temper. This may become habitual with him. When the habit grows on him and becomes chronic, he may be called a passionate person. The sex feeling does not often rise to the level of a passion in normal individuals; but it may develop abnormally in certain individuals and such a person may be deemed passionate. Passion is a deep seated emotional bent marked by a degree of permanence. An emotion rises, dominates, and subsides; but a passion goes on increasing all the time. Passions may and *do* die down; but it takes a long time. Passions grow and disappear only as the result of long continued and persistent effort.

Intermediate between emotions and passions are sentiments. Though we have emotions we are not exercising them all the time. We may hate liars and love truth speakers but we may not do so all the time. The emotion arises at particular times and disappears when the cause is removed, reappearing when there is cause for it. It is an isolated happening. A sentiment, on the other hand, is a semi-permanent disposition to exhibit emotions in certain determinate cases. Patriotism for instance, is a disposition to feel towards one's country in a certain manner. It is a sentiment which Mr. Shand defines "as an organised system of emotioal tendencies centred about some object". Even in common language, we distinguish a sentiment from a feeling. We speak of a sentiment of hatred but a feeling or emotion of anger. The sentiment is more permanent than the feeling or emotion which is but a passing experience. It is part of our mental make-up. A sentiment is an acquired organisation of dispositions which has reached a certain degree of stability. Whereas, a feeling is mostly presentative, a sentiment is largely representative and ideational.

We may thus develop a sentiment in relation to our country. This sentiment is not inborn within us. But it often links itself up with our instincts and uses the instinctive channels for impression and expression. Thus love of country may make use of the instincts of pugnacity, ownership, admiration, suggestibility, subjection etc. This theory has been developed by McDougall who finds a correlative emotion to every instinct. A sentiment has an intellectual element as well as an emotional element. It consists of an intellectual comprehension of the object of the sentiment with organisation of the appropriate emotions round that object. Indeed sentiments are more or less of the character of intellectual habits. They represent a coherence of emotions leading to consistency of conduct, sentiments in turn cohering to form the master sentiment namely the self-regarding sentiment, which establishes personal identity and personality.

We shall deal with the Moral Sentiment under character and the Intellectual Sentiment under Curiosity. Here we shall take the question of cultivating the Aesthetic sentiment, by which is meant the cultivation of taste and the development of the sense of beauty resulting in the enjoyment, the critical appreciation, and sometimes in the production of works of art. Aesthetic education has suffered neglect along with emotional education. It found little place in the curiculum until Rousseau's advocacy brought it into the field of attention. Aesthetic education is of the greatest importance for its recreative value. It appeals to the play element in the intellectual life of man. When anything is enjoyed for its own sake, and not for its practical utility it gives artistic satisfaction. Again we cannot enter into the race's spiritual life until we learn to appreciate all the artistic heritage it has left behind. Psychologically art carries with it emotional development and thus makes attractive both intellect and will. Art also has an ethical value in so far as it shows vice in its hideousness, and virtue in its beauty. The object of aesthetic education is to cultivate the sense of beauty and to do this well we should cultivate the elements that go to constitute the aesthetic sentiment. We should train the senses for artistic appreciation, improve the powers of observation and educate the imagination. The environment of the pupils should be artistic and should be extended by excursions to beauty spots. The school should not offend against aesthetic canons. The school buildings and environs, the school decorations and furniture; the teacher's dress and everything about the school should be neat, natty and beautiful. The art subjects in the school should be

increased in number and given more time. The teaching of art should be improved, e. g,, Literature should not be taught as language but as artistic appreciation. Freedom, leisure and a high standard of excellence are contributive causes for the development of the aesthetic sentiment. Freedom promotes the creative impulse, leisure is the indispensable precursor of art as hurry is its great enemy, while the insistence on excellence in everything that is done in the school promotes the desire for the perfect. Finally teachers should give inspirational interpretation of artistic subjects.

Reaction

Colvin and Bagley : *Human Behaviour.*
Kennedy Fraser : *Psychology of Education Sec. III.*
Betts : *The Mind and its Education* : *Chap. IV.*
Strong : *Introductory Psychology for Teachers pp. 13—45*
Colvin : *The Learning Process Chap. III.*
La Rue: Psychology Chap. XIV.

We have said that mind is given to us more for behaviour than for knowledge. Till now we have concerned ourselves with the means by which the mind obtains knowledge of the outside world and assimilates it. But mind not merely receives impressions from the outside world: it reacts on these impressions ; not only does it make the outer inner, but also the inner outer. There is reception and reaction, impression and expression, thought and action. On the basis of the knowledge that it receives of the outside world, the mind reacts on the world. This is the field of will which we have said is the third component of consciousness. The environment provides the stimuli to which the organism responds. The stimulus reaches the mind through the senses and the reaction comes through the muscles. The will is the reagent of consciousness and mind is but a middle term between the senses and the muscles.

From the point of view of the nervous system three types or levels of behaviour are known. We have said that the nervous system consists of the central organs, the end organs and the connecting organs. The end organs are either sense organs or muscles, the connecting organs are afferent or efferent nerves, and the central organs are the brain and spinal cord. The stimulus that excites the sense organ is carried through the afferent nerve to the central organ which gives rise to an impulse that travels by the efferent nerves and eventuates as a response by the muscle. The term

sensori-motor-arc is the name given to the entire pathway traversed by a nerve current from the point of its origin to its terminus. Three different types of sensori-motor arcs are recognised depending upon the complexity of their make up and the degree of consciousness involved in the reaction, giving rise to behaviour of three different levels. (1) The Pure Reflex arc, (2) The Sensation Reflex arc and (3) The arc involving the higher mental processes. At the first or Pure Reflex level, the sensori-motor arc involves the sensory neurones, the gray matter of the cord or the basal ganglia and the motor neurones running out to the muscles. Examples are the pupillary reflex where the pupil of the eye contracts or expands according to the brightness or other wise of the light. We have no control over it, but it takes place automatically. The reason why one is blinded either in passing from the dark to the light, or vice versa is that it takes an appreciable time for this adaptation to take place. Other examples are the movements of the heart, lungs, stomach and intestines, and sneezing. Sub-habits are also reflex such as a tipsy woman playing the piano, soldiers marching while asleep, etc. A reflex is comparatively simple and frequent. It is rapid, the eye-wink taking about one twentieth of a second and the knee-jerk about three hundredths of a second. I eflexes are relatively perfect at birth and are inherited. The Sensori-motor arc of the second level is known as the sensation-reflex. It involves all the mechanism of the simple reflex and in addition the sensory motor areas of the brain but not the association or thought centres. Thus a tickling in the nose gives rise to sneezing; irritation in the throat to cough'ng; the flash of light insures the closing of the eyelids. All these involve no conscious thought, purpose or interest. The simple sensation was enough to insure the act. The sensori-motor arc of the third level involves all the mechanism of the lower levels plus the thought areas of the brain. For example the tickle of a fly is felt at the nose. Ordinarily the sensation would result in the motor reaction of the hand by which the fly will be whisked off. But supposing the hand is engaged in dissecting, it cannot do this and ingenuity tries to get rid of the tormentor by blowing a puff of air from the lips. This involved the making of a plan and brought into action the higher thought centres of the brain. Our diagram illustrates these three levels. Even in the simplest eight factors are involved, a stimulus, the afferent nerve, the sensory or receiving cells, the fibres connecting them with the motor centre, the motor cells, the efferent nerve the motor response and the report back that the act had been performed.

The Three Levels of the Sensori-motor arc and Behaviour.

Levels of Consciousness	Levels of the Nervous System.	Levels of Behaviour
Consciousness characterised by Thought Action incited by sentiment.	High Level. Association areas of Cortex.	"Free Behaviour" wholly "acquired" volitional.
Consciousness characterised by a Feeling or Emotion which touches off the act. Behaviour not guided by Thought.	Mid Level. Sensory areas of Cortex.	Partially fixed Behaviour. Acquired; Habits Inherited; Instincts.
Consciousness may be present but is not necessary to control behaviour.	Low Level. Gray matter of the cord or subcortical ganglia.	Fixed Automatic Behaviour. Acquired : Sub-Habits Inherited : Reflexes

Such are the elements of human behaviour and the nervous organisation on which it is based. Portions of our behaviour are caused by reflexes, others by instincts while still others by conscious thought or by deliberation and choice. Hence when we have defined education as meant for behaviour, as the organisation of apt reactions to all the situations of life, we should consider how we can influence these elements of behaviour. All of them are not equally amenable to education. Some are unlearned non-variable behaviour, others are learned, variable or acquired behaviour. We should therefore consider the nature of unlearned behaviour and the laws underlying learned behaviour. But the very structure of the nervous system we have discussed above and on which all behaviour rests imposes on us a pedagogic maxim of great importance and general application. This has been formulated by James in the famous statement "no reception without reaction: no impression without correlative expression". Every impression that reaches the mind through the sense organs must find an outlet in action. This is the result in the first instance of the constitution of

the sensory—motor arc. Besides the stimulations which flow into the brain from the various sense organs are currents of nerve energy. Energy cannot be destroyed and these nerve currents must eventually issue from the brain in the form of motion. An expression that simply flows in at the pupil's eyes or ears, and in no way modifies his active life; is an impression gone to waste. It is physiologically incomplete. It cannot be properly lodged in the memory, for to ensure that, it should be brought into the whole cycle of mental operations. It is the motor consequences that clinch it. The most durable impressions are those on which we have acted or otherwise inwardly reacted. Even in the older pedagogic methods with their insistence on parrotlike repetitions, the verbal repetition provided for this kind of expression and thus deepened the impression. Such reactive conduct has been extended by the introduction of all those methods of concrete object teaching which are the glory of our contemporary schools. Verbal material is apt to produce baleful misunderstanding unles based on concrete experience Therfore it forms but a small part of the work of a pupil in a modern school where more scope is found for his activity. He must maintain note books, make drawings, plans and maps, take measurements, enter the laboratory and perform experiments, consult authorities and write essays. The most considerable extension in this direction consists in the introduction of Manual Training which we shall discuss under the instinct of Constructiveness. These considerations show that the teacher should see that he gives adequate opportunities for expression in the classroom. Not all impressions in life get adequate expression and so it is not necessary to give expression every time. First of all the teacher should apportion the value of an impression. If he finds it worthy enough he might give it scope for expression when only can he be sure that it has made its proper impression. If he has been teaching a theory he sets the pupils to work out examples; if the meaning of a new word he calls for sentences using the word; if some moral precept, then historical instances exemplifying it, if botany it must find expression in gardening; if science in experiments. No impression without expression. The converse of this is also true and we can say with equal truth, no expression without impression. We have a sense that we have performed the work and the return wave of impression completes the whole experience. This is important within the schoolroom. Since it is normal to get this return wave of impression after acting we shouid provide for it in the school work. This deems wrong in principle the concealment of examination marks

results and standing. In such cases the pupil is frustrated of the natural termination of the cycle of his activities, and often suffers from the sense of incompleteness and uncertainty. It is psychologically wrong to expect the pupil to work for the work's sake.

Learning by doing is a direct result of Rousseau's teaching that the child's spontaneous and natural activities are essential ingredients in his education. In the hands of Pestolozzi and Froebel this principle emanated in the law of the activity of the pupil as against the activity of the teacher which was the guiding principle in the systems of Herbart and Locke. Another element in the teaching of Rousseau gave rise to the influence of Biology in education. He said that the child passed through several stages in its growth and education should make use of the characteristics of each age. In the hands of Stanley Hall this led to an emphasis on the recapitulation theory and to the culture epoch theory in the hands of the Herbartians. Thorndike who had demolished the faculty psychology and the theory of transfer of training, attacked and repudiated the extreme claims of the recapitulation theory but was nevertheless forced to concede that education should start from the biological endowment of the child. This forced him to make an inventory of the elements of the original nature of man which he considered to be potential responses. The great task of education was to connect the situations with responses. Hence he gave rise to the stimulus-response, S—R. psychology and the principle of specificity. Education consisted in learning specific types of behaviour (See Thayer: *op. cit.* chap. IV-VI).

The practical aim in education which defines it in terms of behaviour, in the last analysis amounts to organising within us a mass of possibilities of reaction. "The uneducated person is one who is nonplussed by all but the most habitual situations. The educated person is one whose powers of conduct are so organised that they fit him to his social and physical world. In other words the educated person is one who has an apt reaction to every situation of life. Just how a human being behaves depends upon two factors, upon the elements confronting him and on his own internal make-up. If we know the external elements and the internal make-up we can easily tell what the response will be. Thus if an educated person sees 2+2 or c-a-t, he will immediately respond with "4" and "cat." His education has established *bonds* or connections between 2+2 and 4 and between c-a-t and cat. Therefore education has been spoken of as the creation of bonds. The

situation acts as stimulus on the organism which responds with an apt reaction. Thus in the case $2+2$ the sense of sight is stimulated, the stimulation is carried to the brain, which thinks 4, and this in turn is carried to the muscles of the throat and makes them say 4. The *situation* will include objects arousing sense organs and representations arousing mental states. The *response* will be in the form of muscular and glandular activity and consciousness resulting from having acted. The *bond* refers to the connection between situation and respone and consists of a pathway made up of nerve cells over which current passes when the situation occurs. We use the words *situation* and *stimulus* in a broader and narrower sense respectively. When the word stimulus is used, we refer to the external object only and not to the mind states which will be included when we use the word situation. Such different words are not available for response. But when we use it in relation to stimulus we refer only to the muscular and glandular part of the response and not to the conscious part. Thus situation-bond-response is broader than stimulus-bond-response. By the latter we largely mean the education of the nervous system. We have seen, that depends upon exercise. The more the sensory stimuli, the better the organisation of the nervous system. The whole of education is taken up with the establishment of bonds, the changing of bonds, their strengthening and their substitution. Knowledge of this fact is of very great importance to the teacher. His task is so to present stimuli that a situation will confront the child which will lead to a desired response. This means that the teacher should have a fund of knowledge and experience, so as to know the psychological connections between situations and responses. Such knowledge will help him in two ways, first it will enable the teacher to present the right stimuli and second, it will cause the teacher immediately to look for the presence of unsuspected elements in a situation when the desired response does not result. For example a boy who was transferred to a new school was described in the transfer certificate as good and clever. The teacher thinking it would help the boy to good behaviour and that it will form an example to the other boys hung it up in a prominent place. This did not result in the expected good behaviour because the boy was reacting to the jibes of his classmates at being "good' and so was trying to show by every means that he was not "good," How to form, strengthen, retain, change and eradicate bonds form the essence of the Learning Process to which we shall advert now.

The Laws of Learning.

Thorndike E. L : Educational Psychology Vol. II.
: Human Learning.
Kilpatrick W. H.: Foundations of Method Chaps. II to VII.
Bode B. H.: Conflicting Psychologies of Learning.
Thayer V. T.: The Passing of the Recitation Chaps. VI-VIII.
Sandiford P.: Educational Psychology Chap. X,
Pintner R.: Educational Psychology Chap. VIII.
Fraser K.: Psychology of Education Sec. III Chap II.

Man is a modifiable being. His inherited endowment sets the limits within which modification takes place and his immediate environment decides what modification shall take place. Thus a child born in Madras will mostly learn to speak Tamil, one born in Rajahmundry will mostly learn to talk Telugu, while one born in Trivandrum will mostly learn to speak Malayalam, each according to its linguistic environment. There is a perpetual interplay between the individual and his environment. The environment presents situations to which the individual should react. Each one of these reactions leaves its impressions on the mind and a man of experience is one who has a large store of such experiences.

We have to keep on reacting to secure the even tenor of our lives. If something happens to upset it, we are annoyed and we shift our reactions until satisfaction results. We wish to avoid annoyance and to secure satisfaction. It is this law of hedonic selection that incites us to shift our reactions to the same situation until satisfaction results, or to shift our reaction when the situation changes until we strike on the satisfactory reaction. To this we give the name of "trial and error" learning or the "hit and miss" method. The learner of swimming enters the water, puts himself in the attitude of swimming has a sinking sensation, beats hands and feet, has a sensation of floating and propelling, keeps on doing it, has satisfaction and at last by repeated exercise confirms the method of swimming. This is true not merely of physical habits like cycling and swimming but of mental acts like the recitation of a stanza of poetry. We learn the poem, repeat it, get stuck, go back, and read it, repeat it again and perhaps go through with it till the end. This is the way baby learns to speak. When it says the right thing satisfaction results and the knowledge is confirmed. If we continue being pleased with "Baby talk" and prattle, it will be long before the

child outgrows his twaddle. Mere repetition will not cause learning. Improvement comes only when the result pleases or annoys. Pintner tells the story of a boy who was sent to a detention class and set a task. The pupil had written "I have went" in an essay and so the imposition was to write "I have gone', a hundred times. When he had finished the task he saw that the teacher had left the room and meaning to be polite left a note to her saying "Dear Teacher, I have done my lesson and seeing you were not here, I have went" Repetition had not stamped in the correct form !

This is the general course of human learning and Thorndike was able to formulate its laws by experimenting with animals. Experiments have been carried on with fish, turtle, chickens, porcupines, rats, cats, chimpanzees and gorillas. Rats are very convenient for experimentation in the learning process. Easily bred and handled, the white rat shows consuming curiosity which renders him eminently teachable. Observations have been made as to how they learn to work out of a maze of the Hampton Court variety. The sense of confinement and the desire to get at the food outlet, with punishment in the form of electric shocks for failure serve as incentives to work out of the maze. The rats are found to learn the maze with repeated practice, to eliminate all unnecessary movements and thus to reduce the time required. In one recorded experiment the first trial took 1804 seconds, the next 986, the next 542 and so on until the 10th trial took only 33 seconds. The errors diminished from 14.9 to 1.1.

A hungry cat was caged in a box in sight of food. The box could be opened only by pulling a string which released the catch that held the door bolted. As soon as the cat saw the food, hunger and confinement incited many reactions. The head was pushed between the bars, the air was pawed and the cat jumped about and made many random movements until by accident he pulled the string and released the catch. With successive trials the time required to do this became less and less and random movements were gradually eliminated. The first trial required 160 seconds the 24th trial took only 7 seconds.

Koehler's studies of learning in chimpanzees carried out in the Canary Islands have been epoch making as giving rise to the school of Gestalt psychologists. These chimpanzees were not confined. They were provided with ropes, poles, sticks and boxes which they could make use of, if they were so disposed, to secure bananas hung up beyond

their reach. They learnt to stand a pole erect and to clamber up it and secure the bananas before it toppled over but they could never pile up the boxes successfully. Kœhler contends that in these cases, learning was not by trial- and-error and elimination of wrong movements but by "insight". Trial and error is a misnomer. The true description is learning by selection of the successful variant. This kind of learning is common both to animals and men. We learn to ride a bicycle, drive a car, use a typewriter by eliminating the wrong moves and by selecting the successful ones. Kœhler's chimpanzees could not have solved the puzzle in their own heads by conceptual thinking. Theirs was only a case of rapid learning and not insight. For instance if a boy is caged like the cat in the puzzle box his early attempts will be of the random type but once he had learned the trick his time will be very short and the curve of his learning will resemble the insight curve of the chimpanzees. Therefore there is no reason to think that in the chimpanzees, learning is different in kind from the cats. When a man who is thinking out a problem suddenly calls out "I've got it" he is not solving it by insight but is only at the end point of a long trial-and-error thinking. Insight therefore may be only an unanalysed form of learning in which trial and error play a great part and in the case of man it is highly complicated by the use of language.

The first of Thorndike's Laws of Learning is called the Law of Effect otherwise called "The law of satisfaction and annoyance". It is stated by Thorndike himself as "When a modifiable connection between a situation and a response is made and is accompanied or followed by a satisfying state of affairs, that connection's strength is increased; when made and accompanied by an annoying state of affairs, its strength is decreased." By "modifiable bonds" we exclude reflexes and other non-variable forms of behaviour. By a satisfying state of affairs is meant "one which the animal does nothing to avoid, often doing things which maintain or renew it. By an annoying state of affairs is meant one which the animal does nothing to preserve, often doing things which put an end to it. There are both original satisfiers and annoyers. We like to eat when hungry and to eat when satiated is annoying.

The second law is the Law of Exercise or Frequency. It has two parts-that of Use and Disuse. When a modifiable bond made between a situation and a response is exercised its strength is increased. When such a bond is not exercised

over a length of time the connection is weakened. This is the old saying "Practice makes perfect" and its truth is heightened when exercise is associated with intensity, vividness and recency. This law works in close harmony with the law of Effect.

The third law is spoken of as the Law of Readiness. When a bond is ready to act, to act gives satisfaction and not to act gives annoyance. When a bond is not ready to act, to be forced to act gives annoyance. A reaction must be satisfying to the individual and it is satisfying only in the degree in which it has achieved its purposes. The purposes of human beings vary and what gives pleasure at one moment annoys at another. Therefore readiness describes the preparedness of the organism in a particular direction when so prepared, to act gives pleasure and not to act gives annoyance. It is also spoken of as mind-set-on-an-end. When the mind is set on achieving something, to achieve gives pleasure and to be baulked gives annoyance. Thus when a child is about to go to the playing field, to detain him with lessons is annoying, to be allowed to play gives pleasure. This is why we should begin with the easy and proceed to the more difficult. In mental tests the first few questions should be well within the powers of the candidate to answer. The fault of the old copybook models in writing, was that they were too perfect and incapable of ever being reproduced by the pupil. The readiness of the mind to act is at the bottom of what we call motives desires and purposes. Without the will to learn, no learning could take place. Hence motivation is the cause of all learning. Where the child's interest is enlisted in his education, the effort required is usually forthcoming.

From the point of view of learning, reactions can be divided into simple and complex. The simple reaction involves only one muscle or closely grouped set of muscles. Such are simple movements of a portion of the body as the outward sweep of an arm. Complex reactions involve almost all the muscles of the body in a definite succession as in swimming. In the case of the simple reaction all that we have to discover is the individual movement and the speed and force with which we should make it The complex reaction should be led up to by first learning the elementary movements. The initial stages of learning a complex reaction is marked by a number of unnecessary movements which have to be inhibited. Thus beginners in writing or cycling make a large number of unnecessary movements. The child sticks its tongue in the cheek, wrinkles its brows and goes through contortions to isolate the required movements. For

the child there are always two processes in learning a complex reaction. He should first learn the simpler processes which constitute it and then fit them together. The adult knows these simpler processes and with him it is only a matter of fitting them together, the only handicap being that he may have learned wrong forms which have to be unlearned. This distinction creates a difference between the learning of children and of adults. Thus in the matter of writing it has been discovered that the child's progress is facilitated by first taking him through the simpler processes. This breaking up should be of the process and not of the product. In the olden days the letters were divided into their component parts of curves and lines and these were taught first by means of the "pot-hooks" of the copy-books. The Montessori Method proceeds, however, by an analysis of the process. The process of writing has been analysed into the holding of the pen or pencil; and the following of the shapes of the letters. By means of scribbling the child acquires the method of holding the pen or pencil. The co-ordinations of movements necessary for shaping the letters are acquired by following the shapes on large sand paper letters with the finger-tip, without being at the same time troubled by the co-ordinations involved in holding the pen. The child himself then combines the two.

There is always a choice of reactions when an instinctive reaction is not provided by the nature of things. Almost any reaction may be chosen at first. "But once any specific reaction has been chosen or *used*; then this one will be more likely than any other to occur on a future experience of the same situation, other things being equal." Education consists in the gradual choice of the most appropriate reaction to any given situation. Therefore the Law of Use tells us to prevent other reactions taking place and to give the appropriate reaction proper exercise. It is of great importance that the first reaction should be correct. Otherwise the incorrect reaction should have to be unlearned which is a matter of great difficulty. This necessitates that the teachers who are responsible for the beginnings of a new subject should always be the best, as it is the initial stages of schooling that are most liable to the evil effects of bad teaching. A bad teacher cannot do much harm later when the pupils have established enough good habits to be proof against his failings. Again the Law of Use tells us that to correct any mistaken way of reacting, by calling attention to the false way is fundamentally wrong. To pillory the bad spellers by publicly exposing a list of misspelt words for a

lengthy period is an unsound pedagogical practice. The proper procedure would be to find out enough occasions to inculcate the correct spelling and to avoid with even greater care any opportunity of stamping in the false impression. It would be more right therefore to post up lists of correctly spelt words instead of lists containing incorrect spellings. Mr. Fraser mentions an example which proves the truth of this contention. He was being drilled with other recruits during the Great War. One of the squad handled his rifle wrongly. The drill-sergeant got his rifle from him and showed publicly the mistaken movement he had made. On the next occasion many of them made that false movement though they had never thought of it before. So we should take care not to suggest the false. This is very important so far as moral training is concerned. Often in chiding misbehaviour, teachers attribute motives to boys which they could never have thought of; but having heard it for the first time they are tempted to indulge in them later on. Similarly many by protesting too much suggest arguments for their opponents. The Law of Use is at the basis of all good drill work in school.

A glaring case of disregard of the Law of Effect is the use as a means of punishment of processes which should be learned by pupils. Many give as imposition tasks, matter which has to be learnt by pupils such as the table of weights and measures; and thereby attach a definite feeling of dissatisfaction with regard to them. We should make agreeable to the pupil a reaction that is desirable. This is the principle in animal training and should hold true also of human learning. The feelings which should thus be satisfied by the reaction are largely instinctive.

Some of the pedagogical precepts based on the experimental work on learning may be considered. As a result of his researches in the learning and teaching of Arithmetic Thorndike has formulated several conclusions. Our object in regard to any school subject is the formation of a hierarchy of intellectual habits. This should be on the principle of building up the more complicated habits on the simpler ones. First of all we should choose the habits to be formed, select the best order in which to form them and decide on the best means of forming them. Thus in forming arithmetical bonds we should first choose whether we shall select $3+6=9$ or $\begin{array}{r}3\\ 6\\ \hline 9\end{array}$ Obviously the former is better. Having selected, we should see that we practise one set of bonds at a time,

ot beginning a new set until the first is well established. In multiplying it will be well if we first have multiplication without carrying, then carrying with no zero complications, and so on. We should be careful to see that bonds once formed do not have to be broken for progressing in learning. In typewriting it is better to learn by the touch method without beginning with the sight method. In public speaking it is better to start speaking without notes from the very outset. There should be variety in the practice, otherwise monotony would interfere with learning. Objective methods may be used to verify results which process would bring the understanding to the help of the memory; but all explanation of the *rationale* of processes may be postponed until the pupil attains mastery over the process itself. The bonds should be so arranged that they will be renewed and confirmed by other studies in the curriculum and by life outside.

Such precepts should be kept in mind in establishing a hierarchy of reading habits. Gates has done the work for reading that Thorndike has done for Arithmetic. In Reading Writing and Arithmetic speed and accuracy are important considerations. We have seen that the quick memorisers are also the best retainers. Speed and accuracy are similarly correlated. Accuracy is of the greatest importance in Arithmetic and it could be ensured by proper teaching methods. Speed is of great importance in Reading and Writing. It has been discovered that the speed of reading in children could be increased about 50 per cent without prejudice to their ability to comprehend. Even in adults the average speed of Reading is only 300 words per minute, Reviewers read at the rate of 480 words per minute. But there are quick readers who attain to a rate of 830 words per minute or even 4200 words per minute (Adams: *Students Guide* p. 162). Slow reactions are due to bad habits and so implanting good habits in the 3 R's will improve speed. Slow speed may mean hesitancy which could be got over by increased practice.

We learn what we practice, so if we want to learn to speak aud write English correctly, we should practice these activities rather than hoping to speak fluently and correctly by studying Grammar. By practising to answer probable questions under examination conditions we shall improve our effectiveness in examinations. This tells us that we should avoid irrelevant reactions lest they also be learnt by repetition. Errors belong to this category, They are learnt as much as the correct forms. It has been shown

that errors in arithmetic have become persistent and involved much labour to eradicate.

The fact that we learn what we practice has deemed dubious certain aids to learning and mnemonic devices. Children are taught to begin writing by tracing letters in grooves or transparent paper or on sand paper &c. It has been demonstrated by experimentation that children who learnt to write without such preliminary aids make better progress. In arithmetic counting on the finger becomes a pernicious practice which could be broken only after considerable effort. We have already said that mnemonic devices only form more material to be memorised. Pintner speaks of a device by which he kept the order of three streets called after Spring, Long and Gay by saying to himself "spring along gayly". He passed it on to a colleague who had a similar difficulty and heard him passing it on to a third. Only it had now become "spring gayly along". So the device made by oneself is always better. (Pintner: *Op. Cit.* Chap. 10)

Instincts.

Colvin and Bagley: Human Behaviour Chaps. 8, 9 & 10.
Fraser: Psychology of Education Sect. I Chaps. 11 & 14.
Welton: Psychology of Education Chap. 4.
Horne: Principles Chap. 22. Jones: Principles Chap. 3.
Strayer and Norsworthy: How to Teach. Chap. 2.
Dumville: Fundamentals of Psychology Chap. 12.
Nunn: Data & First Principles of Education Chaps. 11&12.
James: Talks 6 & 7.

We have defined education in terms of behaviour. It consists in the acquirement of a mass of possibilities of reaction at home, at school and in the training of affairs. Not all of these are learned behaviour as each child is born with a number of capacities and possibilities of behaviour which are known as reflexes, instincts, emotions and capacities. These constitute unlearned behaviour.

We should distinguish among these. Reflexes are the reactions. limited to various parts of the body, which follow unerringly when exposed to certain stimuli. The instinctive reactions are more complex, in which the whole man is involved. Emotions differ from reflexes and instincts in several important particulars. Firstly an emotion is spread over the whole body unlike the reflexes and instincts. Secondly an emotion involves the glandular and viseral systems

of the body more than an instinct or a reflex. The ductless glands have been shown by recent research to play a large part in emotional expression. Thirdly emotions are chaotic and of an incoherent nature. Unlike reflexes and instincts which run smoothly and for which we are prepared, emotions overtake us suddenly and overmaster us. Fourthly, emotions are accompanied by arrested movements, organic modifications of circulation, respiration and metabolism which are self-preservative in character. In capacities we are concerned chiefly with reactions of an intellectual type. The capacity to learn differs in different people. Some are quick, others are slow. Some have an aptitude for one thing while others show an innate capacity in a different direction. Some have musical talent, others have artistic talent, still others mechanical talent. (*Sandiford.* Chap VII *Pintner* Chap 1.)

We have said that the educability of man is largely due to the insignificant part played by these reflexes and instincts or unlearned and fixed behaviour in proportion to the great part played by the intelligence and therefore of learned or free and acquired behaviour. But this preponderance has not been universally conceded. Some say that our heredity, stock, endowment, nature, determine our development, and not environment, individual choice, or nurture. This contention is put forward by the Mendelians and Galtonians who say that each one of us is but an omnibus on which ride all our ancestors, that our life has been determined pre-natally for us, that we are like 80 year clocks which have been wound up before birth and go on ticking off the time. If we accept this view the futility of education becomes apparent. It is supported by an imposing array of evidence. (Read *Keatinge*: Studies, Chaps. 2 and 3.)

Mendel experimented with varieties of peas for eight years keeping careful record. First he crossed tall and dwarf peas and the first generation produced only tall peas and so he called *tallness* a dominant characteristic. But when these offsprings were crossed, for every three tall peas there was one dwarf pea. Hence *dwarfness* was called a recessive character which came out after being submerged for one generation. In the next generation the dwarf peas or the peas showing the recessive character bred pure and brought forth only dwarf peas. Of the three tall peas one remained pure and brought forth only tall peas; while the other two remained hybrid, that is giving in subsequent

generations the ratio of three dominant to one recessive. This will be very significant if applicable to mankind. Desirable dominant characters could be preserved and undesirable recessive characters might be eliminated by suitable mating. There is a tendency in normal human beings to mate with their kind and for the feeble minded with theirs. While the latter could produce only feeble minded the former may bring out undesirable recessives. In mental disorders and diseases, though there is no direct descent, there is a predisposition to the family disease, which could be lived down only by the most rigorous right living. Certain physical characteristics like colour of the eyes, shape of nose, texture of the hair are all inherited in certain degrees. (*Averill*: Chap. 22-27).

There is such a high degree of correlation between a child's physical and moral qualities that the latter says this school must certainly be determined by the former. Since physical qualities are the work of "nature", moral qualities therefore cannot be produced by education or "nurture." Heredity in moral and mental matters could not be confidently asserted but Galton's researches into hereditary genius have brought forward the truth that some of the characteristic of great men have been inherited. He found that a man's immediate parents contributed half to his inheritance while all the other ancestors contributed the other half in a similar proportion. The histories of such families as the Jukes and the Kallikaks, have demonstrated the ineffable character of hereditary endowment. The Jukes are the 1200 descendants of a lazy fisherman of new York who was born in 1720. Of these the careers of 1040 are known. 300 died in infancy, 310 were in alms houses, 440 were wrecked by disease, 130 were convicted criminals; 60 were theives, 7 murderers. Only 20 learned a trade of whom 10 learned it in a state prison. The history of the Kallikaks is more illuminating. One Martin of good English family had illicit relation with a feeble minded girl, 480 descendants of which have been traced. Later he married a respectable English girl of good family, 469 decendants of whichu nion have been identified. Of the former 143 were definitely feeble-minded and only 43 were normal and the history of most of them is disreputable. Of the latter all were normal and most of them were doctors, lawyers, judges, educators, men and women prominent in every line These examples show that both the good and the bad are ineradicable. So ask the Galtonians, where does education

No one will deny that this is an extreme position; but it carries at the same time a condemnation of the Herbartian view of the nudity of the mind at birth and the power of education to fashion the plastic mind to take any shape the educator pleased. Even enthusiastic Herbartians like Dr. Hayward have now admited that the doctrine of the master has to be toned down. The soul does not merely consist of acquired ideas but possesses also specific inherited tendencies. Still Dr. Hayward thinks that these are so plastic that nurture can do what it likes with them. So he says that heredity is but a "spectre" that vanishes as soon as we penetrate beyond the abstractions of statisticians and get down to concrete facts. No more unpromising stock can be imagined than that from which children of Barnado's Homes come. Yet training has made them as good as any other children. Again during the American Civil War and the recent war, talent was discovered in unexpected quarters which had till then lain latent under a depressing social system and a stultifying education. In these cases the environment has transmuted inherited handicaps. Again there is no doubt that Galtonians overlook the real nature of man's life which is lived not on the physical plane but on a mental plane. The great instrument of human progress is "social heredity' which can be obtained only by education and cannot be transmitted physically. Hence there is great need for education; but there is also urgent need for education to take stock of inherited qualities. As a matter of fact every acquired reaction is either a complication grafted on a native reaction or a substitute for a native reaction. The teacher should therefore have a knowledge of the native reactions and the methods by which they could be modified and manipulated.

Many misconceptions are common when the nature of instincts is in question. These arise out of the fact that instincts have been mostly studied in connection with animals and insects. We cannot enter into the minds of these. Hence the relation between mind and instinct has not been stressed but only the resulting behaviour. Thus instinct has been identified with instinctive behaviour. This is to lay stress on the wrong point and is responsible for such wrong statements as that it is blind, that it is unvaried, specific and fixed, unaccompanied by intelligence, observation or judgment. This may easily be the case with lower organisms which are simple and have to meet with situations simple in character. Under such circumstances the organism might

one manner as the key fits into the lock. But instinct in more complicated organisms could not be expressed in terms of behaviour. We should have to analyse the state of mind that gives rise to the behaviour. Reflexes and instincts from this point of view may be looked upon as preferred pathways or conductive paths in the nervous system which have been found to be of survival value and therefore transmitted to posterity. An instinct is but a complex of reflexes. A certain situation gives rise to a predisposition to react in a definite manner, accompanied by a characteristic emotion, resulting in action. Such is the nest-building instinct in birds and beavers. The action is unvaried and unvariable. But in man varied situations may give rise to the same instinctive reaction and varied action may result from the same instinct because his mind and state of emotion will determine these. So the instincts are modifiable in the case of man.

Thorndike's cast iron system of preformed bonds between situation and response implicit in the human body has not received support from the researches of Prof. Jennings on the development of the frog. Under normal conditions one half of the germ cell develops into the right half of the frog and the other into the left half. But if the two halves are severed each half develops into a full frog. Though at a certain stage the parts of the cell which will grow into different parts of the body are known, by skilful surgery different organs may be made to develop from the same part of the cell If physically speaking, there is no preordained way in which parts of the body develop out of the germcell, how could we be sure that its psychological correlates namely preformed bonds between thought and action be substantiated or maintained? (Thayer *op. cit-* chap 7) Thorndike, however, advised that study should be made of the precise situations which gave rise to instinctive responses and the specific character of these reponses. Such a study has convinced psychologists that the organism shows at birth a great number of unorganized and chaotic movements which are the units of reactions. The play of environmental stimuli on these builds up systems of reaction, to which we give the name of instincts. As a matter of fact they are mere reflexes so overlaid with habits that it is impossible to differentiate what is native from what is acquired. Hence in the work of psychologists like Watson instincts have shrunk in number and the term itself has become almost meaningless.

The modifiability of instincts is of the greatest importance in education. A horse has the instinct of avoiding a

crouching animal, now it shies at a coat by the wayside. We have anger or love towards a person. Not only sight of him but a sight of his photo arouses the same emotion Thus the mother instinct is aroused in us not only by our own children, but by the children of other people and of other races. This is at the basis of the Children's Acts of recent times. On the expressional side too, there is similar variety. Thus anger arouses an emotion which might show itself in the case of the Englishman by the raised fist, by the flourish of the shilelah in the case of the Irishman, by the drawing out of the knife with an Italian or the revolver in the case of an American, the arrangement of a duel where Frenchmen are concerned, the engaging in a lawsuit in more sedate circles, or by the heaping of coals of fire on the enemy's head in the case of Puritans. Thus both on the side of impression and expression the action of an instinct is variable and is brought under the directive force of the intelligence. This is the difference between the instincts of man and of animals. The dog might become angry and bite you, if you take his bone away from him; and so will the child get angry if you remove his toy. But the occasions which will rouse the anger of the dog and the acts to which they would lead him would remain the same throughout life but in the case of the child both the occasions and the reaction will change. His wrath might blaze out at a tale of ancient wrong and might express itself in twenty years of political agitation.

Shifting the reflexive or instinctive response from one context to another has come to be known as *conditioning*. A Russian physiologist called Pavlov, succeeded in transfering the conditions under which saliva was secreted by a dog. The sight of meat leads to a salivary flow in the dog. Pavlov presented along with the meat the sound of a bell and repeated the expeiiment so often that at last when the bell was rung, even when there was no meat, saliva began to flow. The dog had become conditioned to the sound of the bell and a natural response had become attached to an artificial situation. When the experiment was repeated many days after, it was proved that the dog responded with a flow of saliva to the sound of the bell. Watson has experimented with babies showing how native reactions become attached to strange situations. When a steel bar is suddenly struck behind the ear of a baby, it reacts with fear, starting, trembling and crying. The process is repeated until the child reacts to the sound invariably with fear symptoms. When a rabbit or white rat, or monkey or ball of fur is presented the unfailing reaction is to reach out the hands to manipulate

them. Now, if when the rat or rabbit is presented the steel bar is struck, the hand is withdrawn and fear symptoms begin to show themselves. If this procedure is continued the child comes at last to show fear to the rat or the rabbit or the fur even when there is no sound. The conditioning is permanent and spreads to other and similar things. Tchekov tells the story of an uncle of his who tried to teach a kitten how to catch mice. The kitten was taken to a room and all the windows and doors were closed. Then a mouse was let free. The kitten was absolutely indifferent to its presence. So the uncle gave it a sound beating. The next day and for several successive days the experiment was repeated and so was the beating, until the very presence of the rat made the kitten scamper off in fear. Left to itself in due course the kitten will have learnt to k ll mice. But the methods followed by Tchekov's uncle made the cat run away from mice in fear even after growing up. In the same way, the methods, of teaching little children, subjects in which they are not interested through punishment, leads to their hating those subjects ever after. The writer had the experience of being conditioned in Dr. Thorndike's laboratory. He was asked to sit behind a screen and his hand was fastened to a button. A bell was rung and if the hand was not withdrawn at the signal, he received a rather painful electric shock. The shock did not invariably follow the bell and many times even when the hand was allowed to rest on the button no shock was felt. But ultimately after about an hour the sound of the bell was the signal to withdraw the hand involuntarily though this conditioning was not permanent for when the experiment was repeated seven days later, no conditioning was noticeable. It is possible to uncondition conditioned reactions. When the baby in the experiment mentioned above, was later presented with pleasant experiences such as good things to eat, along with the white rat or the rabbit he forgot the fear and reached out his hands to manipulate as of old. The importance of conditioning to education is obvious. Children never come to us nondescript. Their instincts have become conditioned through the stimuli of their environment. So they should be brought very early into the school. The movement for pre-school education has its justification here. Subjects of study should be surrounded with pleasant stimuli.

Another consideration that makes instincts less fixed and brings them more under the control of intelligence is that they are not all of them present at birth, They keep on appearing all through the growth of the child to maturity.

Thus the instinct of fear is met with at 3, the gang instinct in the preadolescent stage, the sex instinct appears at about 12. Therefore when an instinct ripens there already exist many organised paths of nervous discharge through which it can find expression. Moreover it ripens when intelligence is already active in directing conduct. The instinct gives the propulsive force, the intelligence may add the directive ruling. The *delayedness* of instincts thus adds to their modifiability. The *transitoriness* of instincts is also important for education. Instincts do not continue in all their vigour throughout life. There is a time when they may be developed, otherwise they may be atrophied. The business of the teacher is to strike while the iron is hot. There is a time for fixing in children skill in drawing. For training the social instinct and for training them in appreciation. The altruistic feelings for example should be trained while one is yet young. When people grow up the instinct of emulation appears silly to them. Instincts become powerful in life only when they are given adequate scope. The environment tends to stimulate or retard the growth of instincts. This leaves the field open for education. The teacher might select the serviceable instincts and promote their growth by suiting the environment. This is why the petted child which has everything done for it, like Peter Pan never grows up, while the child of the gutter is precocious and "knowing".

Instincts are absolutely indispensable for education. If we for a moment compare a human being to a ship at sea, the currents and the winds may represent the traditions and customs of the society, the engines and the propeller to the instincts, and the captain at the bridge to the intellect. The instincts supply the primary motive power in the mental life of the individual. The importance of this to the teacher is obvious. Through instincts he can get the pupil to do anything, without the appeal to them even his best laid schemes may go astray. For reaction on the part of the pupil is an essential factor in the learning process. Without reaction we could have no hold on the pupil's attention or conduct. The pupil should do something before you can have your purchase on him. Even a bad reaction is better than no reaction at all. Thus in the course of a lesson on right angles, I may place on the blackboard the diagram ∟ and tell them it was a right angle. If I place another ⅃ and ask them what it was, some may say unthinkingly right angle, but there will be at least one to say that it is a left angle. It is easy to teach that pupil because he has thought over the matter and reacted. He saw

the first diagram incline to the right and thought it was called a right angle for that reason. The next diagram goes towards the left and so he argues it must be a left angle. He has thought about what constitutes a right angle and the teacher can easily tell him what does. If the teacher wants to touch the springs of action he should know about the instincts. He should appeal to instincts to interest and to secure reaction.

Instincts can be stabilised by building habits on them as foundations. They can be done away with, transformed or sublimated and modified by means of punishment, disuse and substitution. *Punishment* relies for its effectiveness upon the principle that pain tends to put an end to an activity which involves it. We have already seen that it has its limits because it is negative in character and because its results cannot be permanent. We also do not know the amount demanded in any particular instance. The converse is also true namely that the resulting pleasure tends to get an activity repeated. The child which fears the dark is punished every time and when he shows no fear he is rewarded. *Disuse* depends upon the power of a hostile environment to weed out and a favourable environment to ensure, the growth of an instinct. This method is unsure because we do not know when the instinct arrives and when it is at its bloom, so that we might suit the situation. This method would leave a light burning in the bed room of the child which fears the dark until the child left off fearing. The method of *substitution* requires knowledge of instincts in general and of each child in particular. The time and individual attention required are very great. But the method is sure, positive, economical in that it makes use of the energy supplied by nature and is withal educative. In the case of the child fearing the dark this method will make bedtime a time of joy when he could listen to pleasant and beautiful stories.

Many different classifications of instincts have been made such as individualistic, parental, social and adaptive. We cannot discuss them all. The most important are the adaptive whose function is to adapt the organism to its environment. They include play, imitation, curiosity, acquisitivness, constructiveness. We shall briefly consider their nature and the means of educating them.

Curiosity lies at the basis of thinking and of speculative thought. Plato said "all philosophy begins in wonder." It is the craving after uiversal life, after a larger and fuller cognition. But the instinct should be refined from the crude

form in which it expresses itself in little children before it can become the hand-maiden to knowledge. Dewey recognises three stages (1) Physical curiosity. This is the same more or less as the tendency to explore and be active. The child is for ever reaching, poking, pounding, prying. Objects are sucked, fingered and thumped, pushed, handled and thrown. This gives the necessary acquaintance with things which is at the root of knowledge, as it brings out all their qualities. (2) Social curiosity. When the child begins to know that he could eke out the knowledge presented by things if he made a reference to others, he immediately makes use of it to the full. He asks those irritating questions 'why'? 'how' 'what is that'?. This is not a demand for scientific explanation, but a mere overflow of physical activity which formerly led him to be poking and pulling, opening and shutting. The search is for a larger acquaintance with the world. But this contains the germ of and leads up to, the intellectual curiosity of a later stage because there is a feeling that the outward appearance of things, is not the whole of the story. (3) Intellectual curiosity comes up only when the things which are observed give rise to problems which are not solved by asking others but only by means of cogitation. Intellectual curiosity is an instinct and has to be carefully fostered. In some it is so irresistible that the worst snub will not stifle it; but in others it is so unstable that it easily withers and dies out at the first sign of discouragement. Only when we are born as curious as children can we enter into the kingdom of science. As people grow older they lose their curiosity in carelessness, flippancy, dogmatism routine, self-interest and local gossip thereby becoming vulgar and reprehensible. The teacher's function is to keep alight the flame and prevent it being quenched in one or other of the various means we have described. Within the school room, curiosity affords a most desirable means for restraining certain instinctive tendencies and for redirecting others. If the teacher can arouse a genuine interest in the pupil's mind in any one subject, he has turned it away from other interests such as the migratory instinct which disposes the pupil to run away from school. (Read *James*: Talks pp. 45--47).

Imitation is the tendency to do as others do. It is the greatest factor in learning. Take such a simple thing as walking. For one who has never seen another walking it is a very difficult accomplishment. The instinct of imitation is very active in children because it is the new that gives scope for imitation and to the young everything is new. There are

five different kinds of imitation which are present in different degrees of strength in different stages of the child's life . (1) Reflex imitation. This is the earliest to show itself. A child often cries not because it is hurt but because it sees another baby cry (2) spontaneous imitation is not confined to reflex actions alone. A child might see another clap hands or shake the head and do the same but not with the same purpose as the other. In other words the purpose of the action is not imitated. (3) In voluntary imitation the purpose of the action is understood and the aim of imitation is to achieve the same end. Thus the child may shake the head to indicate negation after seeing another do the same. This kind of imitation arrives after the third year. (4) Dramatic imitation is prominent in the years three to seven. In this, imagination plays a large part. This is why children imitate everything that they see. They play the schoolmaster, the motor driver, the carriage driver, the rider on horse back. As we grow old our surrender to convention is based on this type. It is also the justification for the dramatic method in teaching and Caldwell Cook's "Play Way". (5) Idealistic imitation does not play a prominent part until adolescence is reached. Here the action of the individual is determined by the supposed action in similar circumstances of some concrete or abstract person whom he has set up as an ideal. These ideals are chosen first from the immediate environment and later from history and literature. The second type of ideal has the advantage of not leading to disillusionment and consequent scepticism as will happen when the ideal or idol chosen from the immediate environment is found to have feet of clay. This kind of imitation is a good adjunct to discipline, because one good boy might make the whole class good. Though these five stages have been given in their genetic order, the earlier do not fall away as the child grows. Thus we have the example of reflex imitation in the case of adults when a cough in a church or other large audience gives rise to an epidemic of coughing. A large part of crowd action is dependent on the second type, people not being in a position to assign reasons for what they do.

Imitation is a short cut to all learning. The language literature and knowledge of one age are learnt by another through imitation. In the class room the teacher should form a model in dress, manners, conduct, character, learning and accomplishments. The teacher should have actions performed by whole bands of children at a time. The teacher must give a good model in every kind of work. He should never conduct his work in the spirit "Go and do it as the

book directs", but in the spirit "come and let me show you how". "Practise what you preach" is a saying that recognises the strength of this imitative tendency from the teacher's point of view. If the teacher says good things but does bad things, he would find that his conduct has been imitated rather than his teaching. Thus we arrive at imitation as an ally to good discipline. The tone of a school is a mere tradition kept up by imitation, due in the first instance to the example set by teachers and previous pupils of an aggressive and dominating type, copied by the others and passed on from year to year, so that the new pupils take the cue almost immediately. This tone is changed from time to time if at all by the coming in of new personalities. During Dr. Arnold's headmastership of Rugby he impressed his personality upon the senior students who in turn influenced those around them, and it was possible to recognise Dr. Arnold's pupils anywhere in the world. In this manner a tone and tradition had been created. The outward form in which this feeling shows itself is in the common saying. "It is not done".

Constructiveness. Man is conspicuously distinguished from the lower animals by two considerations—his power of speech and his capacity to use his hands. The pedagogical implications of the former we have considered in full. The latter consideration leads to the exercise of his instincts of manipulation and constructiveness which we should now proceed to consider. Up to the eighth or ninth year of childhood we may say that the child does hardly anything else than handle objects explore things with his hands, doing and undoing, setting up and knocking down. In this respect construction and destruction are parts of the same process. Both signify the same thing, namely the production of change and the working of effects in outward things and represent the will to power.

Bertrand Russell (*On Education*: Chap. 6) suggests that constructiveness has its educative effect psychically even more than physically. The child begins with destruction because it is easier. A child may request his elders to construct sandcastles for him, and when they do so he takes a pleasure in destroying them. But when he has learnt to build sand castles, he does not like to see them destroyed. The way is thus opened to teach respect for other people's property. A child may be disposed to destroy the plants in his mother's garden. But if he is given a small plot to plant, he soon learns to realise the labour and effort which have gone to make the garden and to keep it intact. Thought

less cruelty could be eliminated by interesting children in construction and growth. The taking of animal life may be stayed by the keeping of pets. The wilful destruction of property as in war would have been checked if children's education had given due importance to constructiveness. Bertrand Russell believes that a classical education creates coldblooded men. The chief point in a classical education is conformity with existing standards. It seldom affords scope for creative effort. But science is continually changing and a student may feel he is helping in this process and a scientific education may engrain a belief in the possibility and inevitability of change and a remodelling of experience to suit such changes.

On the purely physical side, the ideal of a rounded education is the production of a person who would have the heart to feel, the head to plan and the hands to carry out. So we shall be mistaken if we fail to bring about the co-ordination of head and hand. Manual training is rooted in the manipulating instinct and the instinct of construction. Its object is to develop habits of thinking in definite practical tangible terms of doing and to give the mind the control of the hand as a vital instrument for realising its purposes.

Many other arguments have been brought forward for the introduction of manual training activities. As we have seen, expression is the natural concomitant of impression. It is a means of providing muscular activity in a scheme of studies which has been largely intellectual. In certain cases this muscular activity would even promote intellectual activity as in the scheme of Seguin. We get an intimate familiary with the physical environment and with the properties of material things in this manner. Manual training promotes habits of observation. Such activities remove the vagueness which is a common fault of verbal description. They confer precision because if you are doing a thing you must do it definitely right or definitely wrong. They beget honesty because you cannot hide bad work as in the case of words. They beget a habit of self-reliance and they provide interest to the boys and thereby eliminate the necessity for discipline. Some people see a practical value in the material sense, so that they believe that Manual training could possibly give the foundations for a vocational training. It is also believed to engender aesthetic appreciation.

It has been suggested that Manual training should proceed from the simple to the complex, and that easy exercises should precede difficult ones. This would be to follow the logical rather than the psychological order and would lead

to formalism as in drawing when lines and curves are taght before whole figures. The psychological order should be followed. The boy should be allowed to construct something in which he has an interest however difficult it may be, in which case his interest in the product will enable him to surmount any difficulties in the process. This is also the natural order. Mankind first of all made things and then only evolved their technique Some have raised the question whether handwork is a subject by itself or only a method. Those who say that it is only a method suggest that it is of the greatest importance in giving scope for expression and for illustration in such subjects as Geometry and History. Its ancilliary value in making boys learn by doing is emphasised. Therefore it is contended that is should be taught in close correlation with other subjects. Others say that it is a subject worth learning for its own sake What the construction might develop in the mind of the pupil in the shape of faculties are only incidental, while the activity itself is the centre of interest. They contend that the content of Manual training subjects produce skill of a kind that is absolutely necessary. These two views are not incompatible. If hand work is given for its own sake it soon becomes mechanical, and if it is given only as a species of motor education to offset mental education it fails to realise its purpose (Read Ballard: *Handwork as an Educational Medium*).

Play There are three forms of conscious activity namely play, work and drudgery. Play is conscious activity in freedom. The boy who calls a stick a horse and rides it, is not bound down by the world of fact but lives in a world of fantasy and the activity is its own reward. Work is conscious activity dominated by the object it seeks to produce. Thus the shoemaker is not at liberty to make the shoe in any dimension and shape he pleases. The activity is pleasing in just the measure the result is pleasing. Drudgery is conscious activity whose value is not evident to the actor. The time-worn illustration is of the father who told his son to carry a load of bricks back and forth across a road. When the boy finished carrying them across and thought the work was done, the father at once ordered him to remove them to their original place. (Read *Jones* Principles Chap. 4). Play and work cannot be distinguished on an objective basis in the shape of the activity itself but on a subjective basis in accordance with the mental attitude of the individual who is carrying on the activity. When a person carries on an activity for its own sake and not as a means to some further end, he may be said to have the play attitude; but as soon as the activity looks to some end outside of itself the person

must be said to have the work attitude Thus what is work might become play and vice versa according to the spirit in which the activity is undertaken. Thus billiards is play to the city magnate but work to the billiard marker. So too foot-ball is play to the college student but work to the professional. (*Mackinder* : Individual Work, Introduction). If we say that the element of compulsion distinguishes work from play, we come across many who elect self-imposed labours such as the explorers, inventors, scientists, politicians and evangelists, so much so that, we may boldly say that some of the best work in the world is done by people who chose their jobs without any external necessity and had no taskmasters except themselves. If reward is the element that distinguishes work from play, there are many who deliberately take the Lady Poverty to wife. These should tell us that work is often entered in for its own sake, a fact which appears to be the case with play. Where we approach from the side of play, it is often like work as in the case where a boy is compelled to take his quota of cricket. Neither can we say that work is seriously done and demands strenuous effort, while such is not the case with play. For often a school boy will scamp his work; and take his play very seriously. Very often as in the case of men of science and authors, very early in their life they occupy their play time in collecting, observing or scribbling. In such cases when does it cease to be play and rise to the level of work? No such distinction can be made. Again if we take the pleasantness or otherwise of the activity as marking out play from work, it is not true that play is always pleasant. It is not pleasant to field for hours in a blazing sun or to receive buffets and hacks in the defence of one's goal. On the other hand work is better done where it is pleasure giving as in the case where the man's heart is in the work. Therefore we may say that the old school of education has made too sharp a distinction between work and play. The highest work such as the artist's or the author's is done because the activity pleases. Let us then elevate work into that sphere where it is play and is its own reward because it satisfies an inner craving, not because of hope of reward or fear of punishment.

The old education said

Work while you work,
Play while you play.

The new says,

Work while you play
And play while you work.

(*Holmes*: In Defences of what is and what might be p. 74).

The old education was for making a large portion of the work within the school drudgery with a view to prepare for the drudgery of real life. If it did not go so far, it at least insisted on the work done in the school being serious enough to prepare the child for adult life. It is the new education that has recognised the utility of the play impulse. Whereas the old educationist repressed all play in a puritanical spirit and looked upon the school as a place of serious purpose, the new insists on making it a place of happiness for the child from which it should not long to escape when the holidays came. This change in view is due to many circumstances. It has been discovered that the largest portion of the child's natural activities is characterised by the play attitude. Hence it is incumbent upon education to tap this large store of instinctive activity and make it an ally instead of an enemy. If repressed it may issue in adult life through unhealthy vents. Properly handled, it should serve as the apt means by which the purpose of education might be achieved. We have distinguished between play and work by the degree in which an activity has future reference. Now the child is not able to look far into the future. If anything should interest him it must have present reference. The activity itself should please independently of its usefulness in the future. The multiplication table may be of the greatest importance in life; but the child is not interested in it. When presented in the form of a game, however, the activity pleases and it is acquired. Hence even the serious purposes of life should be offered in the play way.

The inquiries of psychologists into the origin and nature of the play instinct has taught us its importance in education. Herbert Spencer said that play was due to "superfluous energy". It was the organism "blowing off steam". The energies of the young are not consumed in getting the necessities of life which are provided for them by their parents; and so the pent up energy finds vent in play. This is not tenable because we do not merely play when we are flush of energy but rather when we are tired. It also says nothing with regard to the actual form the play takes. Stanley Hall says that play is recapitulatory or reminiscent. What is play to us now, was serious purpose to the men of a bygone age. If the boy plays Bushmen or Indians it is because he is in that stage of development. Karl Groos on the other hand thinks that play is preparatory and anticipatory. He observes that the impulse to play is characteristic of only such animals as have a prolonged period of infancy, and that it always takes the form of imitating in sport what will be serious activity later

in life. The puppy chases and dodges its brother; the kitten hunts a ball of wool and in this manner obtains all the movements which would later be used in the chase (see *Patrick*: Psychology of Relaxation). The little girl nurses a doll and thus learns her maternal duties. If play is thus a preparation to the serious pursuits of life, its educational value is plain. (See *Mackinder*: Individual work. Introd.).

Play should therefore be a handmaiden to education. We do not say that it must be all play and that nothing of serious import should be done. Things which are "future desirables" should certainly be done; but they should be present agreeables. Geography, reading and writing should be acquired by any one who desires to lead a worthy life. They can be taught as dry barebones of information, or taught interestingly by pleasant games and occupations. The instinct of childhood requires that the second method should be followed. The modern school utilises to the full the play element. The Kindergarten teaches ideas of number, form and colour through play. The sand pile, the clay model and the excursion teach geography. The cultivation of a garden, the keeping of pets, excursion to the Zoo and the country teach nature study. The use of charts, lantern slides, the stereoscope and the cinema gives valuable information. These are not ends in themselves: but only pleasant means of teaching the various subjects. An educational excursion is no mere picnic. The teachers must first of all give lessons on the topics on which observation is to be made and they should see that on return these objects had been carried out.

Fear is one of the emotions. It is accompanied by certain physical states. Fear paralyses activity and is marked by lessened heart beat. At the same time it leads to increased activity which causes accelerated respiration and circulation. Thus the one state interferes with the other and discomfort results and even death. Birds are fascinated by snakes in this way and man's flight is limited by the greatness of his fear. Fear should not be relied on as a positive weapon in the school. It numbs the pupil and makes him forget what he learnt. Besides the teacher or parent who is feared never obtains that intimate personal intercommunication with the boy which is the basis of all good influence. Fear is often the result of imagination. We fear robbery when we have something to lose. Consequently children who are sensitive have more fear than children who have no imagination. Fear is often fear of the unknown and passes off with enlightenment. Fear of the

mysterious passes off with explanation. When a few such explanations are given, the child feels that there must be explanations for other things also and thus comes to lose its fear. This should gradually lead to scientific interest. Fear has played a useful part in human history especially in the earlier phases when men had to carry their lives in their hands. But this does not mean that we should implant fear of dangerous things in children. Children fear shadows; but when we make shadows with our hands on a wall, they soon lose such fears. By making the unfamiliar familiar we may eradicate fears. In such cases even force is permissible. Thus a child may be made to lose its fear of the waves by forcible bathing. Rational apprehension of dangers is necessary; but fear is not. A child should have fear of heights, but this may be instilled by showing him the danger of falling from moderate heights. We cannot eradicate fear from our natures, but we can refine it into moral sensitiveness. This leads us to the social value of fear and as such it has great usefulness as a factor in discipline. By various stages the instinct of fear grows into discipline and the moral judgment. The child desires some food in a dark room but is afraid. In the next stage he is afraid that his father will punish him for the fear. In the third stage he is ashamed that if he did not get the food he will be punished. In the fourth stage he is ashamed that his parents might scold him. In the next stage he gets the food because others might think him to be a coward and in the next he is ashamed of what other boys might think if they knew of his fear while in the last stage he is afraid of his own ideals or critical self. In this fashion the instinct of fear is refined into moral self-discipline.

Suggestion is the name given to the process whereby one person is led to believe something and often to act upon it without any definite grounds for his belief, but merely on the statement or under the influence of some other person. Therefore suggestion is a process of cummunication resulting in the acceptance with conviction of the communicated proposition in the absence of logically adequate grounds for its acceptance. (MacDougall) It is present in its extreme form in some state or other of hypnosis. But ordinarily all of us have some amount of suggestibility in us. During the war so high was public expectation in the support of Russia that it was widely believed that a large Russian expeditionary force had passed through England on the way to France. Young people are extremely suggestible and often are deceived easily as a consequence,

Persons in whom the instinct of subjection is great exhibit suggestibility to a very high degree. In such cases there is a disposition to accept statements and assertions made by people whose superiority is assured, without scrutiny or examination. This is called prestige suggestion. Now we know that children are in a state of subjection to their parents and teachers and are therefore greatly liable to suggestion. They have not yet reached the age of discretion when they can reason about a thing and accept it. Hence it is certainly a period when teachers and others who have influence over them schould inculcate moral principles whose rationale they are not yet in a position to understand. Another important pedagogical truth is that if boys have a contempt for a particular teacher they have a tendency to go against what he teaches and do exactly the contrary. This is known as contra-suggestion. Therefore also preaching should be avoided because the teachers who hold an ascendency over their pupils are very few in number and the matter should form part of the lessons themselves. In discipline too suggestion is important as it is better than a command. In the beginning a definite command might be used but gradually suggestion should take its place. But in suggestion we do not give the reason for the recommended course of action and when we do this we are said to give advice. In the end even this should prove superfluous and the pupil should be a self-acting moral being. Suggestion should never be used in science and only sparingly in other subjects such as history, arithmetic and literature for it is likely to stultify all inquiry. Children should investigate and come to conclusions of their own. Another abuse of suggestion is in questioning. We are apt to lead pupils into a false answer by suggesting it in the form of the question. The pupils fall into the trap while if left to themselves they would have arrived at the correct answer.

Attention.

Fraser: Psychology and Education Set. II Chap. 2.
Dumville: Teaching its Nature and Varieties.
Fundamentals of psychology.
Strayer and Norsworthy: How to Teach.
James: Talks 11: Horne: Principles Chap. 28.
Woodburne: Human Nature and Education Chap. 5.

Before the teacher could get his pupil to give ear to what he says or to obey what he commands him to do, he should secure his attention. Now at every single moment

we are assailed by a host of stimuli from the outside world. The mind is not able to attend to all these at one and the same time. Some one object or thing occupies the focus or centre of consciousness while the other things are found at the margin. From the host of stimuli that reach us from the outside world, the mind selects some one thing and attends to it. Attention is focalisation in consciousness. The whole mind has been compared to a mountian looked at from above, with a collar of cloud around its shoulder whereby the lower portions are shrouded in indistinctness while the peak which stands out clearly above the cloud represents that part of consciousness which is in the field of attention. If we know the principles on which the mind selects experiences for admission to this inner circle we shall be able to get the material we teach properly attended to.

Attention is not all of the same type. At least three different kinds have been differentiated. First of all there is Passive or Involuntary Attention. There are many things which we cannot help attending to. Sudden, novel, intense and repeated stimuli would compel our attention. We cannot help attending to them. The second type of attention is the Voluntary or Active kind. In this second kind we are always aware of the effort involved in attending. A student who is working at a task in a window from which he could see his companions playing and whom he would wish to join, is actually attending to his work by an exercise of the will. Then there is a third type of attention which is called the Secondary Passive. In this case something which had been at first attended to with effort and could be kept in consciousness only by means of active attention, has become so interesting in itself that no longer any effort is needed in attending to it. Generally speaking we might say that the task of education is to use Passive and Active attention in the initial stages with a view to cultivating Secondary Passive attention. When a boy begins Mathematics its novelty might absorb his attention, but when that wears off, working at it might involve considerable effort and strain of the will to keep himself at it avoiding all distractions. But at some point in the subject say at Equations or Trigonometry the student finds himself so much absorbed that he becomes oblivious to the outside world. He overlooks the calls of hunger and cold and is completely abstracted from his surroundings. This is ordinarily the explanation of the absent-mindedness of the professor. This must tell us that absent-mindedness is really present-mindedness and that inattention is attention to something else. The mind is

always attending to something. An absolutely inattentive state of consciousness does not exist. We are merely relatively inattentive. Attention is merely consciousness in focalisation and we have seen that the stream of consciousness has always a focus and a margin. Even in day dream and reverie there is a minimum of attention which changes rapidly. Attention is a permanent condition of consciousness and the selection of one thing to attend to from many things involves the rejection or neglect of those other things. The fact of neglect is at first mechanical but soon we learn to neglect things which originally attracted our attention and in this manner learn to concentrate in definite directions.

There are a number of differences between the child and the adult in the matter of attention. The child's attention is omnivorous. It is distracted by everything and doesn't run on one line. His capacity for holding things in the mind is small and the size of the individual unit he can so hold is also small. Hence the teacher should take care not to present too much at any one time and to divide his material minutely. This is very, observable in the use of verbal matter. The child has to pay attention to the letters and words, but the man takes as his unit the phrase and the sentence. This is due to the child's span of attention being small. Even in dictation we have to cut the portion read out at a time, very fine. One of the Binet tests for five years old for finding out feeble-mindedness, is the execution of three commands such as putting a key on the table, shutting the door, and bringing a book. The feeble-minded child cannot keep all the three in his mind long enough to carry them out in the order named. Children are more susceptible to distraction than adults. They are mainly under the control of passive attention. New things, loud sounds, bright lights, moving things, dramatic thrills, in short things of sensation absolutely fill their attention. With regard to duration of attention too children compare badly with adults. This is why the time limits of subjects have to be made shorter in the time table for children. But here too there are individual differences and there are some who are able to pursue some one subject for longer periods. For such the Dalton Plan is very well suited.

Many school practices militate against proper attention, Poor physical conditions are sometimes responsible for inattention. The general surroundings of the school room are not often conducive to concentration and distracting

sights and sounds are not eliminated. No intrusion should be allowed. The opening and closing of doors and windows and loud noises should be banned. The teacher should take such a position in the classroom that he may see the whole class and may be seen by them. He should not pace about like a lion in a cage, indulge in dramatic poses or carry on irrelevant joking, in which case he would attract attention to himself instead of to the subject Hanging up pictures and maps on the wall attract the interest of the pupils and so are not distracting in effect. The unruly pupil is often a source of distraction. Fatigue brings about inattention. Hence bad ventilation which stultifies the brain and unhygienic furniture which impose wrong postures are also potent factors for inattention. The poor mental endowments of pupils, their weak obstinate and indolent wills, and their lack of mental alertness, intellectual quickness and interests are also responsible for inattention. Again poor school practices such as whispering, public punishment and negative directions create distraction.

There are several means of securing attention. (1) The new should be joined with the old and thus apperceptive attention should be secured. Attention is swayed by two forces familiarity and novelty. That which is absolutely new cannot hold our attention, and that which is all too familiar earns our contempt. The new with the old, is what draws our attention. A highly technical lecture by a medical man to a mixed audience of doctors and laymen, would be listened to with rapt attention by the medical men and with boredom by the laymen. We can attend only with what is already in our mind. Thus a country bumpkin stands twenty seconds over a coin cabinet in a museum and twenty minutes before a stuffed tiger, while a professor reverses the order. Each attends in accordance with his apperception masses. The genius is able to attend for a length of time to one subject because his mind simply corruscates with all manner of interesting associations. The attention process is therefore ruled by two currents one from the outside and the other from within. (2) Change is another factor of advantage in attention. We grow familiar with the ticking of a clock and fail to notice it. But if it should change its speed or sound or if it should stop we notice it at once. Attention cannot be fixed for a long time together on anything. Try to fix your attention on a dot. Soon it gets to be two, and a little after you don't see it at all. But if you ask questions about it, how big it is, how far, what colour, what shape etc., it can be kept before consciousness for a longer time. This principle

is understood by advertisers. Instead of illuminating an advertisement by a steady light they make the lights go out and flare up periodically. The lesson is plain for the teacher. He should make his subject show new aspects of itself, to prompt new questions, in a word to change.

(3) Repetition is another contributory factor in all attention. Advertisers use this method successfully. The man who perpetually sees Kruschen salt advertisements is tempted to give it a trial. In the classroom it is often used as is instanced by the sayings *Repetitio mater studiorum* and *Repetez sans cesse*. But it must be judiciously used. Often it produces the exact contrary of attention. Repetition brings about monotony and thereby produces inattention. Again when the teacher repeats a question or a command again and again and makes a habit of doing so, pupils fall into the way of not attending to his first utterance or the first repetition, being sure they would hear it again (4) Many secure attention by shouting, by thumping the table, by clapping their hand and by similar devices. These have only a momentary effect, and produce enforced attention and soon they cease to produce even this when constantly repeated (5) Some ask for attention, claim it, preach its impoitance, threaten, hold out rewards and thus secure attention. But this is a practical confession of failure.

(6) A good time-table in which all the considerations of fatigability have been allowed for, is a great aid to attention. The period should not be too long and the pupils should not be asked to listen continuously to difficult lessons. A single subject should not be allowed to engross the attention. Attention should be distributed over the several subjects and specialisation should be avoided. The pupil who is absorbed in one subject has the makings in him of becoming a research student and he who can divert attention from one thing to another would be a good man of affairs. (7) Teaching methods also determine attention. The teacher should question the inattentive and call for collective answering. Elliptical questions might be asked, variety introduced and pauses indulged in. The routine should often be broken, recapitulations undertaken, illustrations, examples and novelty introduced. Mind wandering can be prevented by appealing to all the senses. Talk should be supplemented with chalk, pictures and objects. The citadel should be stormed from many points. A development lesson easily secures the attention and keeps it as the pupil is following step after step. Here the sense of movement

and advance rivets the attention. The teacher's vitality is a great factor in securing attention. A devitalised teacher can never make himself attended to. The personality of the teacher makes him a dynamic force and he is watched attentively. Attention exercises might be given calling for concentration. The abstract of a story might be called for, as much multiplication might be given as can be done in two minutes' time.

The intensity and extensity of a sensation are often conditions of attention. A loud noise or a bright colour, easily captures the attention. Size also has the same effect. The newspapers print important news in big bold type. By extensity we mean the outspread of a stimulus. A single cloud may not be taken as a sign of rain but if the whole horizon blackens, our attention is perforce called to it. Another factor of advantage for a stimulus in holding the attention is definiteness. That which is vague and indefinite cannot keep the attention as can a clear cut impression. A well defined object in the sky like an aeroplane though small relatively to the blue expanse of the sky attracts the attention. Earl Ronaldshay in describing the Indian plains says "one's faculty of observation becomes blunted by the monotony of the landscape." Whatever the teacher says should be definite and clear cut.

Attention has, besides certain motor concomitants. Attention is the subjective correlate of adaptation or adjustment to a situation. The following are some the adjustments. The sense organs adjust themselves so as to give the greatest clearness and distinctness to the stimulus attended to, as in the case of the accommodation of the eye to see clearly, or in the adjustment of the head and ear to catch the sound better. The body is placed in such a position as most advantageously to receive the stimulus, as the craning of the neck. Finally, the breathing is inhibited and changes in the circulation take place when listening attentively. This is very important for the teacher for, not only is conscious behaviour conditioned by attention, but attention is aided by the proper sort of bodily attitude. We cannot give a maximum of attention unless our bodies are in a proper posture. The teacher should therefore see that the pupils sit properly that they stand erect and move about with energy. Often when attention flags, it can be brought back by changing postures and places and by making pupils stand. But the greatest aid to attention is interest, to a study of which we proceed accordingly.

Interest

Adams : Herbartian Psychology Chap. X.
James : Talks X and XI.
Dewey : Interest and Effort in Education.
Betts : The Mind and its Education Chap. XVIII.

The greatest aid to attention is interest. Indeed the two are being looked upon as so inseparable that interest is coming more and more to be considered the feeling side of attention or the affective accompaniment of attention. Both are co-existent in consciousness. Interest is a feeling—a painful or a pleasurable feeling that accompanies attention. We are interested in both agreeable and disagreeable things. The child is pleasantly interested in the piece of candy in a shop window, or it is painfully interested at a later stage in the dentist's. Beautiful music has a pleasurable interest for us, while hanging has a painful interest. Where there is interest attention follows as a matter of course. At first sight it seems that the converse would also hold true. If we direct our attention to a particular object, a certain amount of interest undoubredly follows, but it is not necessary. I may attend with maddening concentration to a black spot on a sheet of paper, and the more I attend the less interesting the blot becomes. So we cannot assert with equal truth that interest follows attention. Without interest however, attention cannot long be held. Both wax and wane together. To secure attention therefore we should evoke interest and interest has long been looked upon as the gravitation of education.

When we analyse the conceptions underlying interest we discover them to be three in number. Interest is first active, propulsive, projective. We *take* interest. To be interested in anything is to be actively concerned with it. In this manner we are always actively interested and our interests have always an expressional side. It is never passive but already dircted into some definite channel. The story of Buridon's ass starving between two bundles of hay because the stimulation from each is equally strong cannot be true of man. Man's attention is always actively directed in one channel or an other and as such would be engaged upon the one or the other.. Interest is no mere passive waiting around to be excited from the outside We are always interested in one thing or another and the condition of either total lack of interest or of impartially distributed interest is unknown. This deems imprudent the habit of choosing

subject matter unconnected with children's interests. It is said that after subject matter is selected it should be made interesting by the teacher. If the matter is chosen independently of children's interests, their native needs and urgencies, the teacher can "make it interesting" only by dressing up the material artificially with sugar coating or its contrary. Secondly interest is objective; it attaches itself to an object. If we cut out the object the interest disappears The object is interesting in so far as it furthers action, and helps mental movement. There is nothing of interest in a wheel and a piece of string unless as satisfyiug the child's instinctive craving. The artist is interested in his brushes. the gardener in his flowers. Thirdly, interest is personal. Subjectively considered, interest may be looked upon as an emotional attitude which assigns our activities in a subjective scale of values and hence selects among them. The young man who is interested in the race-track, in gaming and in low resorts confesses by the fact that these things occupy a high place among the things which appeal to him as subjectively valuable.

Interest is of two kinds Direct or Indirect, Immediate or Mediate. We may be interested in the doing of a thing or in the end sought through the doing. It we find the doing of a thing positively disagreeble, then there must be an ultimate end for which the task is being performed, which has a strong interest for us, otherwise the task will be mere drudgery. If there is such an interest in the end, it will throw a halo of interest on the means and make it interesting. A boy was told by his father that if he would only make the body of an automobile he will buy him the chassis. In order to secure the coveted prize the boy mastered the arithmetic necessary for the calculation and the drawing necessary for making the plans. He had till then lacked interest in arithmetic, but he now took to it so avidly that he soon left the whole class behind. Children, however, can take interest only in things which are interesting in themselves. They are capable of only immediate or direct interest. Grown ups have to attend to a great number of things which are in themselves uninteresting. These become interesting because there is some motive external to themselves which makes them interesting to us. Much of our ordinary duties are mere drudgery and are cheerfully performed only because of the reward they bring. These ends are not themselves final but form means to other ends and in this fashion the whole of life is interconnected. Just as there is a natural progression from involuntary to voluntary and to secondary

passive attention, so, there is a translation from Direct to Mediate and then to Derived interest. First the child attends to natively interesting things, then by a system of rewards and punishments the school fastens attention to one thing rather than to another, and this leads to a stage where attention is directed to things which are hardly interesting in themselves but as means to certain ends. We may say then that the process of education consists in the systematic elimination of interest Interest is continually being eliminated from certain mental processes, and transferred to others. The child first loses interest in how to hold the pen, then in how to form the letters, next in the proper joining of letters, then in the words and sentences successively and finally has its interest, centred only in the thought process. Such indirect interest, however, finally leads to some kind of direct interest. We may do our work largely because we have a family to support, in which case it becomes pure drudgery. But when we have been at it for some considerable time we begin to love the work for its own sake, we gain an interest in the process. This feeling finds its highest mark in the artist who does his work for its own sake and not for its ultimate reward.

The problem of interest is the fundamental problem in education. It behoves us therefore to consider means by which we can arouse interest. First of all we should appeal to the instincts. Our instincts have laid down the circle of our interests. The mother would listen to the cry of her child even in her sleep, though she may not be disturbed by much louder noises The cat is interested in the rat, the bird in the worm. Therefore the ultimate basis of all interest is instinct. The teacher must therefore appeal to the instincts. Curiosity makes a boy inquire and find out everything about strange objects. We cannot always be showing strange and new things, but we can always make old objects show new aspects and new objects old aspects. Our presentation should always be such as would evoke wonder and a desire to know. One teacher wants to teach that air presses up, tells the fact and begins to illustrate it; another takes a tumbler full of water, places a cardboard on top, inverts the tumbler with the cardboard. The pupils *want* to know why the water does not run out. The first teacher has satisfied curiosity, the other has enlisted it in his service. Another instinct we can appeal to is activity. In teaching to read, it is very difficult to make children recognise words from the book or the blackboard. But if the children are given the cardboard letters in a box and

told to construct the words with them, they would learn to read much more quickly as in the Montessori Method. This would go to show that subjects which are uninteresting in themselves can be made interesting by using intelligent methods.

Repetition produces interest. When a matter is repeated it ought to lose interest. But a thing could not have been properly grasped at the first presentation and hence further repetitions only produce some interest. Besides we begin to feel that there must be some motive in the repetition and then we fasten our attention upon the motive and the repetition secures attention, for example certain points in a lesson are repeated at the end of a lesson and the pupil soon discovers that these will be questioned on next day and so attends to them. This brings us to cases of derived interest. A thing which is not in itself interesting becomes so when associated with something which has interest for us. Thus a boy persistently refused to learn to read; but he was very anxious to find out what the pictures in his book meant. He asked his parent who declined to help but suggested that if he would only learn to read he could easily find out for himself. The boy soon made short work of his reading difficulties. Hence James' advice that we should begin with the line of the child's native interests and offer him some subjects which have immediate connection with these which is the kindergarten way of teaching. Then we should connect with these first objects, step by step later, ideas which we wish to instil. Handwork would be such a good introduction, and the project method takes its fitness from such considerations. Variety induces interest. When we rivet our attention for any length of time on one thing it becomes wearisome. Therefore there is the necessity for the teacher to arrange his lesson in such a manner that it shall reveal itself consequentially in an ordered sequence. Expectation also secures interest. Advertisers understand the importance of this factor. For example we often come across posters on the wall saying 'Watch this space.' We watch to see what will happen there, whereas if the poster had said straight way what it had to announce we might not have given heed to it. This principle is also followed by jugglers.

Interest is also secured by the teacher's sympathetic insight into pupil minds. If anything that is said is related to the life-experience of the pupil it secures attention. For doing this well, the teacher should have the gift of divination

and of placing himself in the position of the learner. In speaking of a railway journey the teacher might base his explanation on one the boy had himself had. Interest often arises out of self-interest. Just as the adult does many uninteresting things for securing the reward, the pupil may take to the dull school-work with interest because he wants later to succeed in life. Interest can be forced by disciplinary measures and it may be caught from others. Teaching methods which arouse interest by rewards are known as the "soup-kitchen" type, those which depend upon punishments, as the "penitentiary" type.

The doctrine that we should make the school work interesting is by no means accepted without opposition. There is a school of educationists who thinks that if everything is made interesting, it would produce an emasculate person who will be unable to face the grim situations of life. In real life everything is not arranged so as to be interesting to us; there is much of drudgery to be performed. If the school training had been interesting throughout, the pupil gets a false view of life. The effort of the pupil not having been called out, finds itself unable to arise when its exercise is really wanted. This is the educational law suit between interest and effort and the origin of the two schools severally known as "soft" and "hard". Those who stand for interest say that it is the only guarantee for attention and under its rule the child would give himself freely to the task in hand. The attention that comes of discipline is not so spontaneous but unwilling attention. The child may give himself to a task for fear of a teacher or other external compulsion but all the time the real heart of his energies would be occupied elsewhere. It is psychologically impossible to call forth any activity without some interest. This disciplinarians are only substituting one form of interest for another. Each school is strong in its negations rather than its positions. Interest and effort are not opposed. Effort for effort's own sake is not necessary neither is interest for interest's own sake. The school-room need not be made repulsive, neither should it be the wishy-washy nambypamby show of the softer pedagogics. Some kind of interest is necessary to let loose effort as we have seen. The only question is what sort of interest it should be? The one school says a painful interest, the other a pleasurable interest. The one school says that the compelling force should come from without, the other that it should come from within. From what we have seen of the nature of interest we know that interest has a sub-

jective side to it and that at no time is our interest disengaged. Therefore the only way of interesting ourselves is by choosing subject matter which appeals to our native interests. The false meaning of the doctrine of interest as consisting in "making the lesson interesting" arises with those people who insist upon the selection of subject matter without reference to the child's interests, powers, capacities and present needs. In their minds subject matter is some thing external to the mind and as such should be made acceptable by the "sugar coating" of interest. If the lesson is uninteresting it should be enlivened by interesting stories. But in such a case the child is interested in the story and not in the lesson. The mind can be momentarily brought back but it cannot be rivetted for long. The reconciliation comes in recognising that though the mind is internal it has an external sweep and that subject matter itself is a part of a growing developing experience. We should then select such material and methods as shall form part of a growing developing experience and then interest will naturally follow. "Interest, the identification of mind with the material and methods of a developing activity, is the inevitable result of the presence of such situations.........Interest is obtained not by thinking about it and consciously aiming at it, but by considering and aiming at the conditions that lie back of it, and compel it. If we can discover a child's urgent needs and powers and if we can supply an environment of materials, appliances and resources—physical, social and intellectual—to direct their adequate operation we shall not have to think about interest. It will take care of itself. For mind will have met with what it needs to *be* mind". At the same time we should remember that there must come a time when we should cast off childish things. The materials and methods of the infant school are not *ends* in themselves. They are the *means* by which the child should be led into the pursuits and purposes of adult life. In other words, we should proceed from direct interest, through *mediate* interest, to derived interests.

Dr. Kilpatrick has discussed with exquisite skill (*Foundations of Method*) the processes of learning under the spur of interest and under the urge of coercion. For example a boy who likes Mathematics, has been set a problem somewhat difficult but not beyond his capacity to solve. His mind is set to the end of solving it by himself, and he has an inner urge to attain this end, with the result that all his knowledge and skill and all his available ideas are in readiness for the task thwarting contrary urges. Even the

difficulties in the way spur him on to greater and greater effort and success brings more and more satisfaction, and satisfaction fixes the method of solution. A different mental process is seen to work in a case of learning under coercion. Suppose a boy who is anxious to go out and play foot-ball is held within doors to work on a sum. His mindset is on the foot-ball game and to be thwarted sets up rebellion within his heart and rouses a contrary set which makes for unreadiness for the task in hand. His end is to go to play foot-ball and there is only the outer urge of the authority of the master to keep him to the task. The resulting unreadiness makes him anxious to scamp his work, perhaps to cheat the master and to get by him to the foot-ball field. The difficulties of the task do not spur him on to greater effort but only to increase his distaste. He is not at his best and all his knowledge and skill are not available to master the problem. His mind wanders and there is less learning. The success he has in the solution does not bring him proportionate learning because his object is not to solve the problem but to get to the playing field. Hence we should not merely pay attention to *primary* learning but to *associate* and to *concomitant* learnings. In this case the primary learning is the method for solving the mathematical problem, the associate learning is the illumination he gets for learning similar problems and other subjects; while the concomitant learnings have to deal with the attitudes he is developing, often the most important part of learning. The boy in the first example may be learning persistence, application and an attitude of friendliness to school work. The boy under coercion may be learning evasion, cheating, disgust for the school and hatred for all in authority. We have an excellent example of this in Booth Tarkington's "*Penrod*." Penrod's classroom is decorated with portraits of Longfellow, Emerson, Hawthorne and other American literati with the object of promoting love of American literature in him. But the whole work of the school is dull drudgery and is keeping him away from his own boyish interests. He hates the school and his hatred transfers itself to the men whose pictures he has to see every day. The school therefore only succeeds in producing the contrary result. This is why George Bernard Shaw speaks of our education as being homæopathic. According to him, if we wish to produce hatred for a subject in adults, we should introduce it into the school, and the pupil would have taken such a violent dislike to it that he would react against it, ever after. Like cures like.

Habit.

James : Talks XIV.
Horne : Principles XXVI:
Dexter and Garlick : Psychology XVI.
Strayer and Norsworthy : How to Teach Chap. IV.
Fraser : Psychology p. 143 ff.

The classic sermon of William James on habit has been preached from many pulpits and we can do worse than repeat it here. Education is for behaviour and habits are the stuff of which behaviour consists. We are but a walking bundle of habits. All our life, so far as it has definite form, is but a mass of habits—practical, emotional and intellectual. Ninety-nine hundredths or possibly nine hundred and ninetynine thousandths of our activity is purely automatic and habitual. Our dressing and undressing, our eating and drinking, our greetings and partings have been so fixed by repetition that they are in the nature of reflexes. In this respect we are but stereotyped creatures, imitators and copiers of our past selves. These habits form an incrustation on our original nature and constitute a second nature. Our virtues as well as our vices are our habits and all that society does is mostly habitual so that habit has been termed the great flywheel of society.

Habit is of the greatest importance in life. Certain desirable reactions which are apt to repeat frequently and often, are worth being mechanized by means of drill in attention. When in this manner the reaction becomes thoroughly automatic the brain is left free to attend to more important things. Were we compelled all our days to devote the same amount of attention to the elementary processes of standing, walking and the like, we would never be able to do anything else than merely to exist. There is no more miserable man than one in whom nothing is habitual but indecision, and for whom the lighting of every cigar, the drinking of every cup, the time of rising and going to bed every day and the beginning of every bit of work, are subjects of express volitional deliberation. We must therefore make our nervous system our ally instead of our enemy. We must fund and capitalise our acquisitions and live at ease on the interest. That is, as early as possible we should render automatic and habitual as many useful reactions as we possibly can. Of course this has its evil side as well as the good. Bad habits become equally engrained and are unmodifiable and we are unable to root them out except by

violent effort Besides when a large portion of our mental activity has become stereotyped we lose our adaptability to new circumstances and our originality, The nervous system loses its plasticity and this is why older people find study so much harder than young people because they have become so set in their ways of thinking, feeling and acting.

Habits are due to the plasticity of our nervous tissue. We do a thing with difficulty the first time but soon do it more and more easily, and finally with sufficient practice do it semi-mechanically or hardly with any consciousness at all. Our nervous system has grown to the way in which it had been exercised just as a sheet of paper or a coat once creased or folded, tends to fall forever afterwards into the same identical folds. The conduction paths get well worn out so that when they offer a certain amount of resistance for the first time to the passage of the stimulus, such resistance gradually weakens and the stimuli pass more and more freely and facilely. With age this plasticity decreases and so youth is the time for the formation of habits.

A few directions might be given for making or breaking habits. These depend upon the common saying "Practice makes perfect". This has been formulated into a law called the Law of Exercise. Repetition with intensity or drill in attention is the essence of this law. Repetition of one's own free will is much more important than repetition under compulsion. When such repetition is in connection with some instinctive action, the effect is great. The other law which operates in habit formation is the Law of Effect. Any exercise which gives rise to satisfaction tends to strengthen the new reaction, while that which gives pain or annoyance tends to be inhibited.

Another suggestion with regard to habit formation has to do with primacy. Let us launch ourselves with as strong and decided an initiative as possible. First impressions are lasting. The initiation into the new habit must be taken with as much of a decision as possible. On the first occasion when the new path is used it is more plastic than afterwards and hence the first impression should be stressed to make a lasting and deep impression. Accumulate the circumstances that would reinforce the right motives; put yourself in the new way; commit yourself publicly to the new mode. James speaks of an Austrian who having promised to his wife that he would give up drinking, to ensure the pledge being kept offered 50 gulden reward to any one who would thereafter find him in a wine shop.

Never suffer an exception to take place. The drunkard who has take to teetotalism comes in the way of temptation and yields saying "I won't count this time". But there is a recording angel in the nervous system who does count and the next lapse becomes more easy. Shakespeare has put it most beautifully :—

That monster custom who all sense doth eat
Of habits devil is angel yet in this
That to the use of actions fair and good
He likewise gives a frock or livery
That aptly is put on. Refrain to night
And that shall lend a kind of easiness
To the next abstinence ; the next more easy.
For use can almost change the stamp of nature.

Each lapse is like letting fall a ball of string wich one is carefully winding up ; a single slip undoes more than a great many turns shall wind again.

Act on the very first opportunity ; for it is the motor concomitants that clinch the habit. Hence you should act on the new resolve at every possible opportunity. Hell is paved with good resolutions. It is easy to slip into hell on the pathway paved with good resolutions that had never been kept. "Sow an action, reap a habit ; sow a habit, reap a character ; sow a character, reap a destiny." (Lubbock) Do not preach too much or abound in abstract talk. Seize the practical opportunities. Make the pupils experience. Show them how to acquire the new habit. Preaching and talking soon become ineffectual.

A few good habits might be taught consciously within the classroom. (1) Diligence must have practice in the school. It will be helped by proper organisation, classification and a well arranged timetable which has had in mind the requirements of the children's health and enables them to put forth activity. Interest in the work should be secured, the example of the teacher should tell and when failure comes in, the authority of the school should be used against indolence by punishment. To older scholars the advantage of diligence might be pointed out. Often laziness is due to ill health and to a certain constitutional disposition. Failure to utilise the child's activity because of ignorance of child nature is another cause.

(2) Cleanliness is necessary for health and influences mental life. Dirt leads to crime. Cleanliness goes with chastity and propriety in personal habits. It adds comfort, increases and maintains self-respect ane improves taste. The

school and teacher should aid by example. The regularity and certainty of the habit should be insisted on. No public exposure but private personal talk would help.

(3) Good manners consist in refined bearing, tact and consideration in our dealings with others, deportment and take stock of conventions. Politeness is the outward expression and it teaches us never to give any preference to ourselves while treating others as ideal people. Good manners are the outward expression of inward grace but often it becomes a thin veneer. All the little courtesies of life should be regularly practised – the respectful address, the becoming manner and speech, the raising of the hat, courtesy to ladies and a due regard to conventionalities generally.

(4) Truthfulness and honesty. Morally speaking truth is that which does not deceive and is the equivalent of sincerity, candour, uprightness, respect for the property of others etc. The cause of untruthfulness are four, cowardice, selfishness, a redundant imagination and envy and malevolence. Truthfulness might be inculcated by means of example. The teacher should be a pattern in this matter and avoid the social lies. He must always seek out the motive of the lie and deal with that, for lie is always a dependent vice indulged in for some purpose. The discipline of the school should be good and if supervision is not lax there would be no opportunity for dishonest work. Undue severity too is injurious as it promotes deceit. Suspicion drives the pupil to cunning and deceit. There might be some preaching, With younger scholars imagination is at the root of much lying. Fear is often the cause of untruthfulness. Children who are brought up without fear are truth speaking. Do not teach honesty by punishment as that will only increase fear and hence cause untruthfulness. Do not threaten; but if you threaten carry out the threat. So do not make a threat which you cannot carry out.

James' emphasis on habit-formation has been taken by some to be far too exaggerated and to minimise the importance of thinking. If the aim of education is to make the conscious pass into the unconscious, it is equally its aim to make the unconscious pass into the conscious, or in other words, to keep the thinking power fresh and intact without being submerged under automatism (Ferriere: *The activity School* p. 7). The upper is the new brain and the lower is the old brain. The upper is the seat of consciousness; the lower performs its work on the unconscious level. When a reaction becomes habitual it is passed on from the upper to the lower brain. This is like paying our savings into a

bank. The lower brain banks our psychic capital and we draw interest out of it without working for it. For instance, we learn spelling with our upper brain but practise it with our lower brain. If spelling escapes into consciousness we are in a parlous state. This does not mean that man's conduct should be ruled entirely by the lower brain. But man is not a mere automative machine, a means and an instrument to achieve certain ends. He is an end in himself. So to preparatory and instrumental values should be added consummatory values in life, which could be realised only by thinking. Rousseau, Graham Wallas, Dewey and Kilpatrick have advocated the view opposite to James and have exalted thinking over habit-formation. Rousseau said "The only habit which I will teach him is the habit of forming none." Graham Wallas says "In the Great Society the influence of men who can resist habituation, and therefore originate, is of increasing importance" (quoted from Thomson : *A Modern Philosophy of Education* p. 63). Fichte said "To form habits is to fail." The doctor with set prescriptions, the preacher of set sermons and the man of rule of thumb methods, are failures. James himself desires the habituation of routine matters to free the mind to grapple with new situations. To think that adaptability is destroyed by habit-formation is to misunderstand the nature of mind and habits altogether, says Bode (*Modern Educational Theories* Chap. IX). Habits are not invariable in their action like reflexes. They have to function in different contexts and it is the mind that should adjust them to each; and habits themselves are the channels through which personality expresses itself, as they are built on natural interests. A man may have developed the habit of being friendly to people which will require in certain cases a nod of the head, in other cases a kind word, in other cases still, a grip of the hand. It is the mind that decides which is appropriate in each case and habits themselves do not function mechanically but through "meanings" and "concepts".

Will, Character, Personality.

James : Talks XV
Betts : The Mind and its Education XIX
Horne :Principles Chap. XXVII.
Dumville : Fundamentals Chap. XIV.
Woodburne : Chap. XII. and XV.

This term has been used by psychologists in many different senses. We shall take the most comprehensive of

them all and by gradually introducing the limiting conditions arrive at the narrower significance. This would have the advantage of bringing out the differentia which in turn form the chief qualities of the will. Some psychologists consider the will as interchangeable with conation. We know what conation means. A conative process is any train of conscious activity dominated by a drive or urge or felt tendency towards an end. It is the perpetual reaching forward of the ego. Taken in this broad aspect we might say all cases of will are cases of conation but not all cases of conation are cases of will except in the broadest light. Some writers use will to represent ideo-motor action, or conations which express themselves in bodily motion. Such movements arise out of the mere arousal of the idea. They are almost like reflexes and instincts and are very much like habits, as the action depends upon previous associations. Thus a man signing a document after long and careful consideration is really performing an ideo—motor action. His idea is so strongly present within his mind that it is able to issue in action. Will is always therefore a relation of ideas to action.

Some writers see the necessity for including a consciousness of the end to be gained, so that instinctive action such as the bird building the nest, is said not to exemplify will. Instinctive action is blind. But the man who is digging for treasure has a clear idea of the end and this is called desire. The man signing the document also is an example of desire because he hoped to gain something by means of it.

But it is not a simple case of desire alone. There are other desires in his mind which conflict with this desire and so he is reflecting to choose among these several desires. Thus a boy with a penny might wish to buy a top or a kite. He deliberates and chooses between the two and ultimately decides for the kite. There are five chief types of decision. The *reasonable* type decides issues by a careful weighing of pros and cons, throwing the judgment on the course of action which has the largest number of arguments to support it. The only caution to be kept in mind in such decisions is that care should be taken that all the arguments are found out, and that we are not deflected from the right course by our feelings. The *drifting* type allows its decisions to be made for it by external accidental circumstances. For example we may be disputing within us whether to work or to take a stroll when a friend turns up and we make his coming a pretext for ceasing work. Here we evade the necessity to

make a decision or at least welcome the circumstances which take the decision away from our hands. The *reckless* type follows a course described from within. When the arguments on both sides appear to be about evenly balanced we decide one way or the other, unwilling to exert ourseves in making a reasoned decision. The *indecisive* type is never able to make up its mind. Such a person is usually in a stew over some inconsequential matter and consumes so much time and energy in fussing over trivial things that he is incapable of handling larger affairs. The *effort* type in which we choose to do the right thing by an effort of the will even though our inclinations and feelings pull the other way. Jean Valjean the hero of *Les Miserables* escapes from the galleys and becomes so respectable as to become the mayor of his town. Suddenly he hears that another had been mistaken for him and arrested. He spends one awful night of conflict in deciding whether he should give himself up or continue in his new life. But when morning breaks he has won. He goes and gives himself up as the escaped convict. This is said to be an act of the will or volition.

In this last case the struggle of desires is settled by the stronger suppressing the weaker. The flying of the kite prevails over the spinning of the top. But often the weaker wins the day. Thus a man has a strong penchant for drink but he conquers it because he wants to be temperate. These are specifically termed volitions or efforts of the will. All ideal and moral action is of this kind; it is action in the line of the greatest resistance. Let I be ideal impulse P brute propensity E effort. Then I *per se* is less than P but in the end I+E is greater than P. Whence comes this effort? Some say that this emanates from the ego which is something apart; but there is evidence of no such thing. There is however something which decides the struggle. This is the self-regarding sentiment. If the weaker ideal stands alone it succumbs to the stronger propensity. But let the man pause a moment to think and reflect, then he thinks of himself, of his position in the world, of his aspirations and ambitions and if these ideas are associated with strong emotions and impulses of considerable force the weaker ideal motive will be reinforced. Thus the impulses arising within the self-regarding sentiment control the impulses of our lower nature. This is what is meant by self-control. Therefore when we speak of an effort of will we are speaking of the power exerted by our higher nature. Consequently if the higher volitions should take place we should have a powerful self-regarding sentiment. This is dependent for

its force both on its ideational and conational aspects. Some people have good notions of right and wrong but these do not eventuate in action. They are like emotions and desires unstable. They have not been made into habits always functioning together. In its highest form, the self regarding sentiment develops a sub-sentiment of self-control which is this habit. First of all it is fear of some, then respect for others and thus, all through the four levels spoken of hereunder. The ideational aspect is induced by acquaintance with men and things. Thus the child grows in knowledge of himself and his environment. By knowing others we know ourselves better and therefore our relations with them improve a great deal. This might also be supplemented by formal moral instruction. The ideational aspect we have said should be developed in action with the conative aspect. Thus a boy of strong physique should not be kept at reflection only, nor should we attempt to form a habit of truth-telling in the child of three, because it does not know its relations to others and cannot make a distinction between imagination and fact. But moral action and volition are not always in conflict of the kind. If the self-regarding sentiment becomes very strong the individual is raised above moral conflict. He attains character in the fu'lest sense and a completely generalised will and exhibits to the world serenity. His struggles are no longer moral conflicts but are intellectual efforts to discover what is most worth doing, what is more right for him to do.

We often meet with two types of will—the Precipitate or the Impulsive and the Obstructed or the Balky. In the Impulsive type action follows so suddenly on the idea that there is no moment for deliberation and we may look upon it as the nearest approach of an ideo-motor action. The nervous organism on which it is based is of the hair-trigger kind. It is the motor type discharging the motor current quickly and readily. It is also due to lack of inhibitions. The attention cannot be held, the pupil can memorise but cannot think, he jumps to conclusions. The training of such a will should be based on the scope given for deliberation and thought. The kindergarten abounding in action is not suitable. Such a child cannot be commanded by word or rod as they will make hi n only more restless. He should be kept at complicated tasks which require prolonged attention Studies such as mathematics and grammar which call for thought are suitable studies. In nature study and geography let him start from the facts. The Obstructed will is due to the weakness of the will or to excessive inhibition. The child may belong to the sensory type and is passive, inert,

contemplative and often held to be dull. This incapacity for action may be either due to lack of power in ideas or to an excessive number of ideas which mutually inhibit one another. In such a case as this, education should provide for expression and the kindergarten is invaluable. The child should be encouraged to be active, to recite, to ask questions, to take prominent part in games.

In the training of the will we should guard ourselves against the influence of the insiduous doctrine of formalism. We cannot train the will by itself, independently of the circumstances on which it is exercised. The will is trained by the daily round of duties and occurrences and the school offers sufficient scope for such training. "On the side of inhibition there is always the necessity for self-restraint and control so that the rights of others may be respected. Temptations to unfairness or insincerity in lessons and examinations are always to be met. The social relations of the schools necessiate the development of personal poise and independence. On the positive side, every lesson gives the pupil a chance to measure his strength and determination against the resistence of the task. High standards are to be built up, ideals maintained, habits rendered secure". The training of the will largely consists in the control of the brute impulses. These impulses are the will of the child, the primitive will. They discharge almost independently of the child, but when once they have discharged the child comes to know what they mean. In this way the child comes to acquire a stock of ideas which later on serves to check the impulse. The child seldom thinks partly because it is impulsive and as such lacks ideas. In adult life we take time to pause and the impulses are checked in the light of past experience. Where this is done we have a case of the mature or developed will. Finally the moral will arises out of a recognition of the solidarity of the social units and the fact that what is good for society is good for every one. The moral intelligence or the social intelligence can be developed in the social life of the playing field and the classroom. There need not be much preaching. The child will learn by suggestion imitation and by doing. There is a place for discipline, of authority, of habits in the training of will which the teacher should appreciate and give effect to. (Read *Jones Op. Cit.* pp. 266-280).

Character.

Character is the sum of all the instinctive and innate tendencies, the habits based upon them and the organisation of these into sentiments with emotions evoked by them

and above all by the ruling force of the self-regarding sentiment. Instincts adjust to unvarying situations revealed by racial history, habits to uniform situations in the individual life, while it is by the will that we adjust ourselves to the varying situations of life, for the will is active intelligence. Will is therefore the most important part of character and Novalis calls character a completely fashioned will. Character is not colourless, it is active. It must take pleasure in justice, generosity and notability. We must say that character is dependent upon heredity and environment, on nature and nurture. Again and again we find in children the immorality of parents breaking out. This is also true of moral natures; they are partly inherited. But environment also plays a great part. If the child is brought up in an atmosphere where there is a strict moral code it gradually absorbs that code. But if it is brought up among immoral surroundings there is a disposition to go astray. From the point of view of heredity we may say that the saint and the sinner come from the same street corner but it is equally true to say that they thrive in different atmospheres. (*Averill*: chap. 39). Actions determined by character as distinguished from reflex and automatic actions, are known as moral actions. The chief ingredient in this is the altruistic sentiment and nobody can be moral who does not develop a social consciousness. Thus moral action and social action are one and the same. The altruistic feelings are not yet fully developed in children and so we could only influence character by developing good habits and true *esprit de corps* and by laying the foundations of a good self-regarding sentiment.

There are various phases in the development of character. In the beginning it is largely made up of the instinctive reactions, which attain firmness and uniformity by exercise. The home is most influential here. When there is repetition and uniformity, habit arises gradually. Habits are tendencies towards certain lines of conduct and so form the essential ingredients of character. Character is but a bundle of habits and habit is the material out of which character is built. "Education is for behaviour and habits are the stuff of which behaviour consists". The school is very influential in promoting good habits. The school routine and discipline are good media for the formation of habits. In the next phase, will becomes of the utmost importance. Character has been described as a completely fashioned will, in which moral principles are so strong that they shape the entire volition. In this respect the teacher cannot form character which must be the work of the child. He can only aid in the formation.

His function is to explain, advise, to warn and encourage, in short the instructional part of it. But this is not everything. The teacher can explain and place before the pupils the excellence of certain virtues both by precept and example. It is the duty of the pupil to adopt them for himself.

It is a nice question whether conduct is the outcome of character or character the outcome of conduct. The answer must be "a little of both". Character shows itself in conduct and the conduct immediately influences, confirms or modifies the character which has so expressed itself. Moral education, therefore should take place through life situations. We shall take a real situation and study its effects in the formation of character. A father returns home after a busy day in the office and desires, quiet, rest and the enjoyment of the evening paper. But the children are noisy. The mother chides them once, twice and the third time the father tells them that if they made any more noise they would be sent to bed. The effect of this is to make them quiet; but this result has been achieved by an external threat and not by changing the inner disposition to consider the rights and feelings of others. The consequence is not desirable for character because the conduct is influenced by considerations of prudence which are selfish and anti-social. In the earliest stages of character education such influences having the character of punishment or of reward might be exerted in the hope that the child would ultimately grow to be a socialised individual. That is why badges, distinctions and other rewards are appropriate to this stage. They are not ends in themselves but by means of associative shift they may develop the character for which they serve as recognitions. They are mere scaffolding for building real character attitudes which function through deliberation and choice of the appropriate habit responses. A good moral character should therefore possess sensitivity to moral issues, skill in judging and choosing the right response; and established habit responses. In each and every one of these, the laws of learning hold and group life, selects, confirms or weeds out responses. For instance if we have a strong sense of duty or honour and have connected appropriate responses with them, we are bound to be sensitive to moral issues and to select the proper response to each and every situation where they are concerned. (Kilpatrick: *Op. Cit.* chaps. 19 & 20).

Personality.

The goal of education is the unfolding of a worthy personality. The word personality has had its meaning

built up from several sources. The old Latin word *persona* meant a mask and takes us back to the dramas where one actor played many parts and to distinguish himself in each, wore a mask. Thus we come to its fundamental significance of the particular character of a person. The Roman conception of personality was over shadowed by political and legal ideas. This was because it was through the state that men realised themselves. The use of the three persons in Grammar contributes the social concept of personality. The emphasis placed by Kant on the moral worth of the individual persons as of greater importance than any material possessions, and the holding forth by modern philosophy of an ideal personality to be striven for, have added new meanings to the concept. Democracy again, has brought up the importance of the individual person. Pedagogically, the bearings of these conceptions of personality are apparent. We should never forget that we are dealing. with individual persons as the subject of education. Having to do so much with curricula, text-books time-tables and examinations, we are apt to forget that these are but means and that the end is the pupil himself.

We may note here the essentials of a worthy personality. The first fact that strikes us is that personality is essentially social. Any individual's conception of himself is largely due to his experience with others. We reflect the character of the group to which we belong. We are all heirs of a social heritage. We soon assimilate ourselves to the nature of the society in which we are placed. In short part of our being, our personality is built from the outside, by our surroundings. The school should therefore provide for a desirable selection among these influences. We can easily tell where a person had been educated; since his speech and bearing loudly, bespeak his education. Therefore if the school surroundings—spiritual, physical and intellectual —have been good the resulting personality will also be good. A second character of a good personality is that there must be proportion and balance among the three components of mind, knowing, feeling and willing. In the discussion of the Harmonious development aim we have already considered this to be one of the aims of education. We do not wish to produce either the man of iron will who rides rough shod or the intellectual splitter of hairs who is not able to come to any decision, far less to carry it out, or the sentimental aesthete. Thirdly, personality carries with it the implication of a knowledge of personal identity. To the infant all the world consists of things to start with, from

which later persons are differentiated. These persons are further differentiated into individuals which process gives content to the *I* or selfhood. This consciousness is often accompanied by a certain assertiveness, which should be given adequate scope. But social life requires both assertiveness and submissiveness and our education should strike the golden mean between them.

Individuality, Socialisation, Freedom

Nunn : Data and First Principles Chap. I.
Mackinder : Individual Work : Introduction.
Mackenzie : Freedom in Education.
Ballard : The Changing School Chaps. 6 & 13.
Report of the Conference of Secondary School Teachers on the Dalton Plan held in the Gipsy Hill Training College 1923.
Report of the New Ideals Conference 1923.
Rabindranath Tagore : Sadhana.
Holmes : What is and what might be.

In its primary use "individual" *means "unit". Anyone of a handful of pebbles is an individual pebble. But individual as it is used in philosophy signifies more than mere numerical distinctness. In order to know the full significance we shculd look inside and see how the various parts hang together. From this point of view the pebble has but poor individuality. If it were broken, its parts will be as good pebbles as the original. But this is not the case of a great business organisation or the economic or moral life of a city. They are exemplars of individuality of a different order. The fact that one business firm is distinct from all other firms is but the least important feature of its individuality. Of far greater importance are the variety of gifts, functions and responsibilities of the persons who work in it, the way in which their multitudinously different labours, conspire to serve a single purpose, the spirit which binds them all together into a single commercial or productive instrument. This kind of individuality is capable of degrees. The greater the coordination of its several parts, the swifter is the response of each part to the whole, and the more the individuality. Such a business may not be broken up into parts as the pebble. If it was attempted

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* *In this I have closely followed Sir P. Nunn's Introducton to Miss Mackinder's "Individual Work".*

to halve it, the result may not be two businesses but a thousand people out of employment.

Individuality in this higher sense is perhaps best exemplified by works of art. A work of art approaches perfection, when the more nearly it approaches complete individuality, the greater the unity which pervades its parts and fuses them into a self contained and indivisible whole. The perfection of a poem, a picture, a piece of music or a building depends upon the perfection with which unity has been achieved out of diversity. This individuality is not due to an accident; but is nothing more nor less than the expression of the individuality of its creator. Therefore that one piece of work differs from another is not merely because the author is more or less gifted but because the various gifts and powers have or have not been brought into harmonious combination to work together for worthy ends. So it may happen that a man of the highest gifts may yet build up only a second rate individuality when his gifts are not properly coordinated and even moderate gifts may develop a worthy individuality. So individuality is the goal of every life. This imposes the necessity for individual work. A poet has to learn and study his art and yet no one but himself can make himself a poet. Poets cannot be turned out by machinery like motor cars. Hence we should see that each pupil finds scope for his own development and that he is treated as a unit and not as an average. "From this point of view it becomes clear, that the true business of education is to supply the conditions under which children may best be stimulated and guided to the fulfilment each of his own individuality. This is the philosophic basis for individual work in schools."

The two corrollories of Individuality are Socialisation and Freedom. The first* of these seeks to solve the relation between individual and corporate life. From one point of view the individual is a unit. Our head and our arms clearly belong to ourselves, so that from a bodily point of view we are each of us separate and distinct entities. But it is not so clear that our minds are separate and distinct entities. A great deal of evidence points the other way. We grow from the animal into the human only in so far as we

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* *Here I have closely followed Sir P. Nunn's address to the Conference of Secondary School Teachers on the Dalton Plan held at the Gipsy Hill Training College in 1923.*

absorb the spirit, the character, already existing in the minds of our parents, and of those who influence us in the nursery, in the school, and later in the wider world of life and it becomes difficult to keep to the thesis that man's mind is his own. "We come into the world with minds as empty as our bodies are naked; and just as our bodies are clothed by others' hands, so our spirits are furnished with what enters into them from others' spirits". (*Nunn* Data and First Prin p. 2). The furniture of our minds is derived from the minds of other people. We share as between nation and nation a perfectly distinct cast of thought, a perfectly distinct outlook on the world. We cannot be dissevered from the point of view of those among whom we live. Many philosophers have been impressed by this truth—that a person cannot possibly grow up into an individual mind except in a social medium. The story of the "child of Nuremberg" is proof of this contention. Kaspar Hauser was brought up as a child, in a hole. Daily a platter of bread and a cruse of water was left by someone whom the child never saw. He ate the bread, drank the water, slept and woke up. This continued until he was seventeen years old. Then his keeper taught him to stand and walk and left him in the streets of Nuremberg. He was taken and adopted as the child of Nuremberg. He was kept in the guard house for safety and the gaoler's children taught him to walk and speak. Later he was put in the charge of a famous professor who undertook his education. It was discovered that Hauser's intelligence was that of a child of two. But his faculties were by no means dull. He had very acute senses and a wonderful memory. He never forgot a face he saw. His only defect was that be lacked the social accomplishments of one of his age. Gradually he learned to behave as a normal human being. (Mason: *School Education* pp. 71-74).

This has led many philosophers to follow Hegel whose system tends to minimise the separateness and distinctness of human beings and more and more to emphasise the oneness of the whole to which they belong. This view has been recently advocated in an exaggerated form in the philosophy of Croce who says that we have no will of our own, but only the organised soul of the whole community. No one will go so far. When we speak of the corporate life, of the soul of a people, of the spirit of a nation, of the mind of a school, we are merely using figures of speech. The only minds, spirits, souls, are the minds, spirits, souls of the individual beings. As a matter of fact we make up our minds out of materials

gathered from the society in which we live. And yet that is the way our bodies are made. We do not for that reason deny individuality to our bodies. Therefore to say that the individual mind is fed by the group mind and made richer by it, is not to deny our individuality. In fact the individual is so made that he cannot live his own life and develop richly except in terms of the general social life. This is the ideal of a democratic education as defined by Dewey. He says "The object of a democratic education is not merely to make an individual an intelligent participator in the life of his immediate group, but to bring the various groups into such constant interaction that no individual, no economic group, could presume to live independently of others." This is Miss Parkhurst's ideal. "Real social living is more than contact, it is co-operation and interaction. A school cannot reflect the social experience which is the fruit of community life unless all its parts or groups, develop those intimate relations one with the other and that independence which outside school binds men and nations together" (Dalton Plan p. 17-18). In the old education the class formed a society under the authority of the teacher. The conditions produced by this are not real. In the classroom the teachers hang up their human interests charm and personality on the rack from which they take down their coats and turbans. The conditions are artificial and the relations entered with the classmates may even be artificial. When the child is submitted to arbitrary authority and to immutable rules and regulations, it is incapable of developing a social consciousness which is the prelude to that social experience so indispensable to manhood and womanhood (p. 17-18).

The other complement of individuality is freedom. The unity in diversity which we have said is the keynote of individuality, is made by an autonomous being. This broaches the question of the freedom of the will. Are there real options in life or are there no real options and things happen not as they may but as they must? Is the universe a dead thing going by clockwork or a live thing going by intelligence? Freedom cannot exist in a universe that is dead, it can exist only if the universe is free, creative and alive. There can be only two systems of education. One adapted to a universe that is dead, another adapted to a universe that is alive. In the first we should aim at adapting ourselves to the necessities of the clockwork, in the second we should equip ourselves for creativeness. Now the question whether there is Freedom or Necessity cannot be decided by words, by argumentations or by logic. These are for matters which

are stable. But man is changeable So soon as you are conscious that there is necessity you stand up and do something that shows that you have freedom. This was the case with Carlyle. He had been keeping company with the metaphysicians who convinced him that his whole existence was a mere cog in the wheel of universal necessity. Then a strange thing happened. It all turned on the difference between being in a condition and being conscious of being in that condition. To have your tooth extracted is one thing ; to be conscious of your tooth being extracted is quite another. The reacting forces then assert themselves and you jump to your feet. When Carlyle felt that he was in the clutches of necessity he rose, drew the sword of the spirit and declared himself free. The highest cannot be spoken but it can be acted. The greatest argument for the existence of freedom is the fact of being free. Our education must therefore accord with the fact of freedom.

But western philosophy until recently, believed in a dead universe that went by clockwork. Western civilization has therefore taken the form of the political and its watchword has been government; and its education on the whole has been repressive of freedom and creativeness. In the East, however remnants of once mighty civilizations are found, whose basis was not political but cultural, and whose watchword was not government but culture, religious culture for the most part (L. P. Jacks Rep. of New Ideals Con, 1923). Mr. Edmond Holmes has analysed with exquisite skill western thought and its influence on education in his work "What is and what might be." The western thinker is incurably dualistic Enslaved as he is to the requirements of his instrument, language, he opposes mind to body, spirit to matter, good to evil, the creator to the creation, God to man; and in each case he fixes a great gulf between the mighty opposites that constitute the given antithesis. Confronted by the mystery of existence he has explained it by the story of creation. Confronted by the twin mysteries of sin and sorrow he has explained them by the story of the fall. This has led to the doctrine of original sin, that human nature is corrupt and ruined and therefore intrinsically evil. Hence he has looked away from this imperfect world to another and perfect one of divine origin, from which information and guidance in the form of a supernatural revelation is available for guidance in this world. This revelation has been to a special people in a special scripture a special law giver, a special prophet, a special church. Thus certain people knew the divine truth and have formulated them into

commandments by obeying which one is to be saved. Thus salvation is to be attained by blind obedience mechanical and slavish. The right to obey one's own conscience, one's own higher nature is renounced and the path of self realisation is abandoned. To keep men to these command ments a system of rewards and punishments have been organised. This Israelitish philosophy has walked into the classroom escorted by the churchmen who were in charge of education. The thunders of Sinai were reinforced by the orders from the teacher's platform. "Do" and "Don't" exhausted the teacher's vocabulary. (See Ballard p. 8)

The pupil must trust his teacher and do what he does. The precise way is told him. "Look at me, see what I am doing, watch may hand. Do the thing this way. Do the thing that way, listen to what I say, repeat it after me, repeat it all together" (Holmes p 51). The child's will had to be broken and something artificial had to be supplied in its stead. In certain over-docile children it seems really possible to build up an artificial personality and th's has been considered desirable and justifiable by certain people such as the Jesuits who thought that man's nature was vile and that the old Adam had to be rooted out. There are others like the Herbartian psychologists who think that the child's mind is a blank and so can be made to take any shape men please by the proper supply of ideas which would form the circle of thought and decide action. Thus an artificially built up completely moral personality can be substituted for the natural organisation. This repression of the natural man may lead to dangerous results later as is seen in the later life of over-repressed children. On leaving school the pupil reacts violently against the conventional education or leads a double life. It is not merely philosophy, religion or psychology that leads the teachers to forcibly dominate the child. Often it is a lust of dominating young people. Dr. Nunn says, that of the 800 young women eager to enter the teaching profession that he had to interview, he invariably asked how they came to wish to be teachers and whether they played at being teachers with their dolls. They mostly answered yes : and they admitted they loved ordering them about and punishing them. (Rep. Gipsy Hill Training College 1923).

Against this theory of original sin and its repression all great educationists have waged bitter war We have already noted the views of Rousseau and Froebel in this matter (see *ante* p. 24-27). Emerson says " the secret of education lies

in respecting the child. It is not for you to choose what he shall know, what he shall do. Wait and see the new product of nature. Nature loves analogies but not repetitions. Respect the child. Be not too much his parent. Trespass not on his solitude". Dr. Maria Montessori approaches the problem from the biological point of view. Each child is a unique manifestation of the life force "the child is a body which grows and a soul which develops. These two forms physiological and psychic have one font, life itself. We must neither mar nor stifle the mysterious powers which lie within these two forms of growth, but we must await from them the manifestations which we know will succeed one other". "We cannot know the consequences of suffocating a spontaneous action at the time when the child is just beginning to be active: perhaps we suffocate life itself......we must respect religiously reverently these first indications of individuality... ......it is necessary rigorously to avoid the arrest of spontaneous movements and the imposition of arbitrary tasks" (Montessori Method pp. 87-88). Dr. Nunn says "Educational efforts must, it would seem, be limited to securing for every one the conditions under which individuality is most completely developed.......Is the school master then to foster with impartial sympathy the making of both an Emile Pasteur and a Caesare Borgia? We reply that the ultimate responsibility of a child for himself does not free the others from responsibility towards him; an educator is not to foster a bad life. There are things destructive to the soul. Life is fenced round with prohibitions which the young explorer may not be allowed to ignore. But the prudent teacher will not multiply his restrictions beyond necessity. It is very difficult to see which life will add to the riches of the world or take away from them and whether we are not opposing merely from our conservative prejudices. Many men in the past have tried to suppress creative activity which have later proved to be of immense good. The futurists have been recently discountenanced and so was Wagner. The women's movement had been received with ridicule and Victorian England will not brook women entering medical studies" (Nunn pp. 6-7). A heroic soul may change the whole world and raise it to a higher level and yet for its strangeness may incur hostility.

The Group Mind.

The fact of *socialisation* within the school brings us to a new idea introduced into psychology by Dr. Mac Dougall. This is the conception of the Group Mind. We have already

seen that a man's personality is made partly from the outside by the society to which he belongs. A collection of individuals, whether temporary as in a crowd or permanent as in a nation behave differently from what they would do as individuals. The mentality of the group is not the sum of the minds of the individuals that go to form the group ; but a separate mind altogether. To speak in chemical language the individuals in the crowd do not form a mechanical mixture but a chemical compound. There is no doubt that human beings behave otherwise in groups than they would do as individuals. On a day of jubilation when a large crowd is come together to make merry over a happy event, the individuals behave in a fashion of which they may be ashamed as individuals. They shout, throw their hats into the air and exhibit the wildest gestures. This phenomenon has begun to be scientifically studied by psychologists, and the results of their study are gradually influencing, classroom methods.

Every *ego* must have an *alter* and it cannot become a living organic entity unless it has other egos upon whom to act. This is only another way of saying that the individual can only realise himself in society. The *ego* changes according to the *alter* it meets with. The boy of fourteen has to play many parts during the course of the day. He is one thing and another according as he meets his brother, sister, or parents, or schoolmaster, or playmates. He is continually changing to meet the needs of the social evironment. His position is very much like that of an atom. Just as the atoms cannot exist just by themselves but should combine with others to form molecules, so could the egos not exist by themselves but should combine with others to form groups. A mere aggregation is not a crowd for the purposes of Psychology. Thus the travellers in a train do not constitute a crowd until something happens to make them function together. If there is an explosion, or if the train comes to a sudden inexplicable stop, heads are craned out and the travellers become a psychological crowd capable of common action. There are various gradations of crowds. There is first of all the individual who resembles the atom. Then there is the *socius* corresponding to the molecule, as is seen in a walking party of three or four, or the people round a dinner table. Then there is a more or less well organized group as in a church or in a political party or a crowd watching a foot ball match. Beyond all these may be distinguished a psychic crowd of people who never meet each other but who read the same newspapers or listen to the

radio. This is an invisible crowd. Finally there is the fortuitous crowd which may be termed a *mob*, as the one that collects round Times Square in New York at about 12 P. M. on New Year's eve, waiting to see a ball of fire drop from the tower announcing the New Year. Then it ceases to be a mere agglomeration and becomes a unit doing the same irresponsible things. Such crowds are very susceptible to be swayed by "leaders". How these aggregations are caused and what effect they have on the individual minds form the content of the new study of Social or Collective Psychology. It has been agreed that the three forces of suggestion, imitation, and sympathy have a great deal to do with collective action; and the process has been described as a reversion to primitive action. A crowd when worked to a pitch throws off the restraints of civilization and reverts to the primitive. The common elements in the individuals of the crowd *fuse* while the special and distinguishing characteristics of each individual *arrest* each other. This fusion and arrest are much more rapid if the crowd consists of homogeneous and non-anonymous individuals.

Now the class is a collective unit of a homogeneous and non-anonymous type. The boys ars of the same age, belong to the same social strata, have the same traditions, the same attitude to sport, the same mental content, and generally speaking the same mental outlook. Besides, all the boys are acquainted with the teacher. The teacher should therefore sense the collective mind of his class, if he is to be effective. *The old education recognised the importance of social life and its books plead the need for the mutual duties of kindness, charity and co-operation. Here also it made the same mistake. While preaching brotherhood and fellowship it excluded the possibility of intercourse of any sort. Boys were isolated from one another and placed under a common authority. Everyday practice shows the danger of this alternation of social and individual life. One cannot pass from the one to the other without blurring the demarcation line. Children who have just been living socially on the playground continue to do so in the classroom; they still try to help each other, to copy, to prompt. Thus they learn hypocrisy. When they have been living selfishly in the classroom, they continue to do so outside and require much longer to learn how to collaborate in their game and to

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*New Ideals Quarterly Vol, I No 4 pp. 18—26,

co-operate usefully and without ostentation for the common goal. To play together is not sufficient. More is required and that is co-operation for useful work. Therefore the new education introduces into the classroom, the same co-operative freedom till now common on the play ground. Children are enabled to live socially, to know and to appraise each other, to co-operate, to choose for a given work suitable collaborators, to accept the control of their own ideas, and to acknowledge that their views may not be admitted.

The teacher should be its leader in the sense that he should understand the collective mind and use it for his own purposes. But the class often has a leader within itself. Some boy of certain qualities of mind and body is looked up to, by his classmates. His great prestige commands influence over his mates. The teacher should make use of this boy and his position for the benefit of the class. Often such a class leader while belonging to the class yet stands outside of it and uses it for his own purposes. Under such circumstances the teacher should treat him not merely as one of the class, but should give him some amount of equal treatment which might be semi-officially recognised by appointing him prefect. The position of leaders under the new regime is most illuminating for the advance that the new education has made over the old. It the class is run on "individualism" and the leader has been chosen for qualities displayed in the "socialism" of the play ground, he will keep his leadership in the classroom, even though he many be a dunce with his books. His influence may even increase because the special social aptitude required in the class room, viz, ability in lessons is not given scope for leadership, but is under the management of the teacher. But when freedom enters the classroom the play leader has to resign, if he is inept and his place is taken by a work leader whose supremacy in the class work will be acknowledged by every one. But even the new leader soon loses his ground, because the new freedom brings out the best in every one and gives him a sense of personal dignity. For equality reigns. The work leader may plan, give directions but each one has something to say. They discuss and do not allow the leader to impose himself upon them. This is how freedom prepares for participation in a democratic society.*

* New Ideals Quarterly Vol, 2 No 1,

International Understanding.

Educational Survey Volumes I—V.
Cory : The Modern School.

We have spoken of the " psychic crowd, ' the members of which have never met each other in the flesh, but are still capable of common thought, feeling and will. The growth of world trade, the improvement of world communication, the popularity of the newspaper, radio and telephone, have constituted the whole world into a "psychic crowd." This solidarity, it is hoped, could be utilised for bringing about international peace rather than universal war. The destructiveness of war has been generally admitted, and it is conceded that all war hereafter will be universal in its effects. As Mr. Wells says " There can be no peace in all the world now but a common peace, no prosperity but a common prosperity". There could be no security for the world without some system of world controls. "We must organise cosmopolis or perish." Such an organisation, could be stable only when it is based on the nature of men ; and the schools are being more and more looked up to, for creating this " goodwill " among men. As L. P. Jacks says " Education is the long looked for moral equivalent for war. "

With a view to devising educational methods for preparing children's minds for international peace and amity, rather than war, psychologists have investigated how the sense of solidarity and mutual understanding develop among children. On the side of behaviour they have come to valuable conclusions by studying the principles of solidarity in the play societies of little children. The kind of solidarity developed in such societies depends upon the kind of rules that are obeyed by the members. A rule exists when the will of one individual is respected by others or when the common will of all is respected by each. In the first instance we have a case of unilateral respect, or the respect of those who obey towards those who impose the rule, without the latter reciprocating the respect. This is compulsion and brings about external solidarity. In the second instance we have a case of mutual respect, of voluntary submission to the common will which forms the true foundation for co-operation. This is known as internal solidarity.

age of 12. If you ask a youngster if it were possible to change the rules of a game, he will invariably reply in the negative, rules having a sanction in his eyes beyond the authority of the players. But after 12 children are agreed that rules could be changed by mutual consent. It is a strange fact, that a great deal of ego-centric behaviour is co-existent with external solidarty. That is, in spite of unalterable rules, children play very much as they like, where their interests are concerned. Older children, on the other hand, show a remarkable sense of honour in their play, respecting the rights of others and settling disputes by friendly agreement or arbitration. The lessons for education from these facts are plain. Education by authority, discipline and indoctrination, do not produce internal solidarity which is at the basis of all co-operation social or international. Only a free education by activity methods and pupil self-government produces such a spirit.

On the side of reason, the development of solidarity proceeds on similar lines. There is a social element in the composition of human reason. Purely individual thought consists in whims and musings and is the kingdom of ego centric fancy and caprice. Until the individual discusses, listens and tests his musings with those of others, they never reach objectivity and logic. As ethics is the logic of action, so logic is the ethics of thought, Just as we have to regulate action by reference to the rights of others, so have we to regulate our thought by reference to the ideas of others. At first children display an external solidarity by adopting ready made truths and preformed judgments on the authority of their elders. These truths command their unilateral respect and do not prevent their having their own ego-centric habits of thought. They are collective compulsions on the reason and the critical sense ; and as in the case of custom, often prevails over truth and right. As the rule is on the moral side, so is the word in intellectual matters. To give oral instruction on international cooperation and justice, is therefore not to connect with the laws of the child's own being and may not lead to international mindedness.

Internal solidarity in intellectual matters does not develop in children until we develop some of its preconditions. The child thinks that he is the centre of the world and that everything is related only to him. He is not yet in a position to understand the relations of things among themselves. This absence of the logic of relations renders him a

slave to concrete perceptual situations. "You ask a boy "Have you a brother?" "Yes," is the reply, "and his name is John" "And has John a brother"? "No, I am the only one who has a brother, John has none." A child of five may be able to point to his right or left hand; but it is not till the age of eight that he can correctly point to the right hand of a person, sitting opposite to him." It is not till the age of eleven that a child can realise, that an object between two other objects may be on the left of one and at the same time on the right of the other. We ask an English child who a foreigner is and he says "A man from a country outside England—a German or a Frenchman." And you ask, "Are you a foreigner?" "No, I am English". This shows the incapacity of the child to objectify experience and to view things from a detachment. That comes only through considerable experience, through the law of concomitant variation, and abstraction. Hence his hold on language, the abstraction *par excellence*, as an instrument of thought is weak. Pedagogic literature is bedewed with ridiculous mistakes arising out of the literal interpretation of words by children. One day a child asked her mother, "Mother dear, do cannibals go to heaven?" "I fear not," said the mother. "Then," asked the child, "do missionaries go to heaven?" "I suppose so" said the mother. "In that case" replied the child, "if a cannibal eats a missionary, he *will* have to go to heaven"? A grasp of language in the abstract, a possession of corresponding ideas, are prerequisites for reciprocal understanding. Children are in the stage of external intellectual solidarity and before they develop internal solidarity, they should be capable of the arts of discussion and verification and of cooperative teamwork. The method of discussion, and of socialised teamwork, are the only means by which we could develop the power of seeing the other man's point of view and of reciprocal understanding. If our schools keep these conclusions in view they could develop individuals who in the moral world, order their conduct in response to an inner urge for selecting the cooperative social rule and to eschew the competitive individual role. In intellectual matters such men will demur to accept the opinions of others on authority but will explore questions objectively and scientifically, look at things from the point of view of others and place reason above blind prejudice.

practice of competition and marks may be first examined. An internationally minded person believing in cooperation could never be produced by a school system using examination and marks. The argument for the practice is that it is an incentive to work. It is not. The rank list of children is periodically posted in the hope that it will make the laggards work. This may be effective with the third or the fourth child who by hard work may hope to get the first or second place, but those who find their places invariably at the bottom give up all hope and lose faith in their powers. The object of an education is not to score marks and to beat others. Matter which is so studied is forgotten when the examination is over, and does not influence conduct. If on the other hand, the child began with its natural interests and studied to solve one of his problems, he is growing in personality. Marks and standing create the notion that competition is a desirable force in life. They limit success and so limit happiness to the few. They glorify achievement and decry consummation. What examination can assess the consummatory value of a reading of *Hamlet*? Individual success and personal aggrandisement are not the standards of life; but the measure in which the individual life has contributed to social wellbeing. Group competition and *esprit de corps* far from being free from these objections, are only creative of bad blood between group and group and tyranny on the individuals. Corporal punishment has an evil influence as it gives pupils the idea that force is the ultimate arbiter in human disputes. "Civilization is the maintenance of the social order by its own inherent persuasiveness as embodying the nobler alternative." The worth of men consists in their liability to persuasion, in their desire to choose the better alternative. School discipline does not proceed by the method of persuasion or the disclosure of alternatives. The only alternatives are; "Do as I tell you, or be punished."

There are two subjects in the curriculum whose teaching may make or mar international mindedness. They are History and Geography. Till now the emphasis in history teaching has been wrong and the history taught has been untruthful. Great emphasis has been placed on military and political heroes and their exploits which have promoted the notion "my country right or wrong." The growth of nations is not so important for human welfare as the advance along the paths of peace, the growth of science and invention, and the products of the arts. The real heroes are not Caesar and Pompey, Napoleon and

Wellington; but the Buddha, Socrates, Archimedes, Galileo and Newton. If the history of a war is taught, attention should be called to its destructiveness, to the facts that it does not pay and that its arbitrations are not final. It is well known that history text books are prejudiced and give wrong accounts determined by national view points. World history would form a better means of creating international mindedness. The teaching of Geography should concentrate on three objectives. A vivid description of life in many lands leading to an interest in them. A considered treatment of the life in each area as determined by the environment which would promote toleration, sympathy and understanding. A scheme by which the interdependence of different parts of the world are shown to the pupils, which will deem rash anything which will rupture such relations. The promotion of international understanding should have a large place in the social aim of education.

The Unconscious In Education

One of the recent developments in psychology, which is of such importance as almost to annex the term "The New Psychology" all to itself, is Psycho-Analysis. The Psycho-Analysts tell us that our behaviour is determind not so much by the ideas wich are to be found in our consciousness but by those deep in our subconsciousness or unconscious self. They compare the mind to an iceberg floating on the sea, the greater portion of which is under water. Forces exerting themselves on the submerged portion have greater power to move the berg than those exerting themselves on the exposed part. We often see an iceberg running in the teeth of a strong wind. The explanation is that it follows the direction of a current in which it is caught and which acts on a larger mass than the wind. In the same way we often find people behaving in the most inexplicable manner, inexplicable that is, from the point of view of reason. This is because their conduct is determined by submerged ideas which have been brought into action for one reason and another. Others compare these submerged ideas to the Titans who according to fable had been buried deep under the earth by hills and mountains heaped over them and who cause earthquakes and eruptions whenever they become restless. These suppressed and repressed desires and wishes often realise themselves in dreams. Hence Psycho-analysts study a person's complex by means of his dreams and by probing into his unconscious self by means

of stimulus words for which the subject is required to supply the appropriate reaction words. The Psycho-analyst method has been used for the cure of mental diseases and has been found to be very successful in shell-shock cases. It is the suppressed complex that leads to the strange behaviour, but once it is brought into consciousness its effect disappears. A dwarfish person, for example, obsessed with the shortness of his stature and brooding long over it develops an inferiority complex which makes his behaviour in society strange. The Psycho-analyst doctor by ferreting out this complex and by making it patent to the patient, brings it within the healing range of the conscious.

The teacher's attitude to this new development of Psychology must be well-considered. He must certainly know about the child's unconscious self. If pedagogy requires that the teacher shall know his pupil, he cannot afford to neglect the large reservoir of the child's experience. But he cannot use the open methods of the psycho analyst to probe into the unconscious self. That would destroy the relation between teacher and pupil. But by informal means he should find out about the submerged self of the pupil. The "mental cases" should be brought to the notice of the psychoanalyst, while the knowledge gleaned of the healthy boys would help in their education, Moreover Psycho-analysis must be emphatically said to help us in understanding other minds, especially pupil minds. The teacher who practises pedanalysis is able to trace cases of misconduct to their real origin and to take measures accordingly. Again the teacher can so arrange his work as to prevent the formation of complexes. "The unnecessary restraints of school life, the anxieties resulting from over-stimulated emulation; the strain of examination, the humiliations that accompany the teacher's thoughtless sarcasms—all these have a tendency to produce unwholesome repressions with consequent complex formation".

The real contribution of Psycho-analysis to education consists in enlightening us on the failures of development and in pointing to suitable methods for the treatment of awkward, difficult and unadjusted children. Somnambulism, stammering, left handedness, fear of open spaces and closed spaces, accidents, omissions, active forgetting, persistent spoiling of exercise books, excessive prudery fault finding and cleanliness, have all been explained in terms of repressions in the unconscious. But the treatment must be with the Psychoanalyst doctor and not the teacher.

Discipline.

Bray : School Organisation Chap. VI.
Fraser : Psychology and Education Section IV. Chap. 2.
Fitch : Lectures on Teaching Lect. IV.
Raymont : Principles of Education Chap. XVII.
Dexter and Garlick : Psychology in the Classroom Chap. 24.
Bagley : Classroom Management.

Discipline is indispensable for good teaching. Without it teaching cannot be successful : with it what little is taught goes a great way. Hence the methods by which good discipline is maintained are a part of school organisation, But the pupil goes to school not merely to get knowledge. He is there to get a good disciplined character. To subjugate one's impulses, to recognise the supremacy of law, and to act according to it, are some of the prime conditions of an orderly and well disciplined life. In this second aspect discipline partakes of the nature of Ethics and hence forms a portion of Moral Education.

Discipline is not something which could be obtained by asking for it, you cannot claim it, you cannot stamp your feet for it, you cannot get it by sweet reasonableness.

"He who in quest of silence, silence hoots,
Is apt to make the hubub he imputes."

It is not a thing to be taught: it is a precondition of learning. It is a part of the school atmosphere. Hence it should be inculcated indirectly by means of the school environment.

Neither is discipline to be learnt as other lessons. Discipline expresses itself in conduct. Conduct is the expression of the will and discipline is the regulation of conduct by the operation of will power in the individual. Fine thoughts and fine feelings are poor stuff unless translated into action. Conduct is the test of life. Conduct is the link between the mental states and actions and this link has to be forged by the individual himself. In other words discipline is attained by doing, by means of habits, by adjusting oneself to the environment in which one lives. It could also be effected by means of rules and regulations. That, is environment and government are the two powers that train and mould character. When the individual accepts them and carries them out in his own life, the

external law becomes an internal one. Hence by means of ideas, habits, environments and government we should make the external law internal.

We can distinguish four steps in this process.

1. The prudential level.
2. The authoritative level.
3. The social level.
4. Thd personal level.

These are in an ascending scale and the child must pass through the lower levels before he can reach the highest. He should have experienced in his own person, each of these various levels, if it is to live and move within him. So it influences through training, and not by instructional methods or telling. Even though these levels are reached one after the other the adult may have his conduct decided by each and every one of them. Thus a man keeps back from stepping into a precipice from prudential motives, i. e., for fear of the consequences. He obeys the laws of his country : he pays homage to the conventions of society and is also influenced by personal ideals.

That tells us that we should at once explain the nature of each one of these four levels. At the first or *Prudential Level* the individual's conduct is decided solely by fear of the resultant painful effects of misconduct. The agents of control are the environment in which persons and things are not differentiated from each other but only from self. This is the level in which we find the child. In the early stages of the development of the child he should be allowed to suffer the natural consequences of his acts, at least in so far as they are not likely to prove fatal or too harmful to him. This is the method which Rousseau and Spencer have advocated in what they called the discipline of consequences. We shall note its merits and demerits presently. Meanwhile we should say it could not be enforced in all stages of the school, as it represents the lowest level out of which the child naturally should soon be made to grow.

The child then reaches the second stage called the *authoritative level.* Persons are beginning to be differentiated from things and conduct is now controlled by rewards and punishments meted out by persons and especially by those who are felt to be superiors. We shall consider the nature of punishments and rewards in this connection. In the third or *social level* conduct is controlled by the expectation of

praise or blame and the agents may be equals. This is the stage in which public opinion is most felt. This is the stage in which a certain amount of self-government should be granted to the pupils. But even this stage does not represent the highest mark of discipline. The man who is always deciding his conduct by the canons of "good form" is in a state of servility and dependence upon public opinion.

The above three stages represent external agencies while the last one—the *personal level*—represents an internal control. In this level the person controls his conduct by reference to certain ideals which he has set up for himself. It implies the complete abnegation of the teacher's authority. But this is what the best teacher should wish for. His influence is greatest when his authority is weakest. In fact it is only by eliminating his powers that he achieves the highest good in the school.

1. *The prudential level* belongs to the pre-school period. The discipline of consequences says that natural punishments are the best. Nature has so arranged that every violation of natural laws shall be then and there punished. If one goes too near a fire one is burnt, if a boy plays with a knife he is cut, if he loses something he should feel the evil effects of the loss. Apply this to the school. If the pupil is late let him go late, if he is untidy and makes a litter let him tidy up, if he breaks the glass in the window let him sleep near it and catch cold; if he does an exercise ill let him do it well; if he wastes his time at school let him lose some of his own time at home; if he destroys property he must restore it at his own cost.

This kind of discipline has certain advantages. 1. It is perfectly natural, eliminates the personal equation and hence raises no question as to its justice. 2. It sets up a right moral standard and does away with the artificial rewards and punishments. 3. It is pure justice and so raises no complaint. 4. It removes the possibility of temper by removing the personal factor 5 It does not hamper the child's freedom by a set of rules. 6. It makes the relation of parents and children and of teachers and children amicable. 7. The penalty follows quickly as a rule.

But it has many disadvantages. 1. The penalty is not always available Where the action passes into habit, as in drinking, the penalty is not there every time. 2. It is not always suitable. A small crime as over indulgence produces

ruin of health, while theft leads only to prison. 3. The penalty is too remote. It is the certainty that deters. When the punishment only comes in the end it loses its fearsome aspect. 4. It may be too severe. Thus Emile would have died if he was allowed to catch cold by sleeping near an open window. We are concerned not with ruining a boy but in rescuing him. 5. The penalty may be insufficient—gambling and drinking still continue despite penalties 6. The penalty may fall on others as when the pupil has committed damage to property. 7. The moral law is left out while only the natural law is taken into consideration.

II. *The Authoritative Level.* Discipline in this stage is secured by means of punishments and rewards, administered by people who are recognised as superiors. This is the stage of school government But this should never be overdone. The boy should not find his freedom clogged with exasperating rules. His life should not be filled with "do this" "don't do that" "stop" "run" etc. Rules should be few and short. The boy should feel that there is a reserve of authority which comes out when needed rather than that it should all be on the surface. It is the unseen which impresses children most. "That virtue is scarce worth the cost which requires ever to be watched."

From this point of view preventive measures would appear far better than positive measures. Among this the foremost is 1. Constant employment "Satan finds some mischief still for idle hands to do". Children have to be active and if their activity is turned into the channels of work they are happy. It they are idle they give trouble and the activity escapes in the shape of mischief. Not only during the hours of work but also during the leisure the boy has to be properly occupied. This is why some have insisted on the importance of athletic games. So too hobbies should be cultivated. 2. Close supervision. Each boy should be closely watched, his peculiarities observed and himself dealt with according to his misdemeanour. Very often misbehaviour is due to the forced posture and the confined atmosphere. Restlessness is at the root of inattention, talking etc. These should not therefore be punished as if they were faults against the moral order. Study each boy and his motives. 3. Drill and mechanical discipline in the ordinary class movements are a great help towards discipline. Obedience and moral training are thereby inculcated. Noise, talking and clumsy movements are avoided. But boys should not

there should be originality, another in which there is mechanised habit. 4. Discipline is facilitated by creating an *esprit de corps* in the school. If the boys are proud of their school and its traditions it would be very difficult for them to go against such traditions. 5. These things notwithstanding it would be necessary for the teacher to issue commands. These would be numerous in the early stages and would become fewer and fewer later on. Unless the little child is told what to do and what not to do he may soon come to grief; but not the grown up boy (a) commands should be few. You should not be too interfering (b) Don't repeat commands. To repeat begets hesitant obedience. (c) We must be firm and decided about what commands we do give. If you are weak and lack confidence in the command the boys would find it out easily and disobey it. (d) Don't revise or cancel your commands as that weakens your authority. This shows that you should be circumspect what commands you give. If you do not consider their implications well beforehand you may come to grief in this manner. (e) Once given, a command should be carried out. Allow no exception to take place (f) Don't suggest the false and hence do not give negative commands. (g) Let them be general rather than particular.

6. The rule is a kind of permanent command and all that has been said about commands applies with equal force to rules. They should be as few as possible. They should be well thought out and clearly expressed. But the best ideal of rules would be when they can be easily done without. To enforce rules we should have punishment of some kind or other. The saddest part of a schoolmaster's life consists in the necessity to inflict punishments. Punishments are bad in so far as they tend to weaken the bond of sympathy between the teacher and the taught. It is the last resort for enforcing authority and therefore frequent punishments do not show good government but the lack of it.

Aims. Punishments are usually meted out with three aims in view. 1. Retributive or vindictive showing the relation between wrong doing and suffering. 2. Exemplary or preventive, to prevent repetition and to warn others. 3. Reformatory. In the case of State punishments they are defended chiefly on the second ground, so that a judge said to a pickpocket "you are punished not because you picked a pocket; but so that pockets might not be picked" They are meant for the protection of society and not for the vindication of the moral law or for the reformation of the offender. School

punishment on the other hand is designed to reform the culprit. Choice of punishments might be made according to the canons of Bentham. 1. Punishments should be proportionate. That is, they should be susceptible of variation by degrees, fines, corporal punishment, tasks etc., are variable. 2. Characteristical i e, they must suit the offence. 3. Exemplary in themselves and in the manner of administration. 4. Economical, not more or less than what is called for. 5. They should be reformatory. 6. Should be compensatory and repair the mischief done. 7. Should be popular and must not give rise to resentment in the school.

Punishments can be broadly classified into two. 1. Those which consist in the infliction of pain or the deprivation of some pleasure or enjoyment i. e., castigation, detention, loss of holidays, imposition, confinement etc. 2. Those which derive their force from the fact that they are meant to be punishments and are known to be so e.g., a glance of rebuff, a word or tone of anger, disgrace or degradation, loss of office, low place in the mark list. Seeing that we have said that we should try to do without punishment altogether we should always try to use the lesser than the greater. There are several forms of punishment. 1. Reproof is quite variable and could be varied and economised by the teacher. From the look of anger to the scourging, the teacher should judge which is best. If a boy is talking fix him up with your eye, ask him a questiou etc. instead of stopping your lesson and decanting on him a storm of abuse. The use of sarcasm and ridicule should be avoided. A good natured laugh may not be out of place, but biting sarcasm is bad as it weakens the self-respect of the pupil and leaves a sting behind. General scoldings are not good as they may include the innocent. Neither should blame be general. Don't call a boy a dunce or a liar ; he will become one. 2. *Positions of disgrace* are effective in junior classes. To stand in a corner, to stand up on the bench, all involve the sense of shame. It was abused in the olden days when the boy was tied up to a pillar, hung up in a basket, made to stand bended with a weight on his back, made to sit on a stool of repentance and to wear the fool's cap. Such punishments degrade the community in which they are awarded. 3. *Loss of marks*. Some teachers take away marks or give bad marks. It is of a petty character and a really good teacher would not make use of it. 4. *Detention*. Loss of play and confinement after school hours are very painful. It is a good form of punishment because characteristical. If a boy is talking he is made to keep quiet, if he is restless he is confined, if he came late

he is to keep late. Hence it is awarded for habitual offences, riotous behaviour and unpunctuality. 5. It is often combined with *tasks*. When these are the lessons which he had not done, the punishment is characteristical. But when a boy is punishd with fifty lines for talking in class or with a hundred lines of poetry for deceitful conduct, they only surround the ordinary school work with odium instead of with interest. Lessons should not serve as a punishment 6. *Fines* are not good. A fine falls on the parents and those who can afford it can coolly neglect it. As two girls in a school where fines were common said "now let us have six penny worth of talk". 7. *Corporal punishment* has been universally condemned but no one is prepared to abandon it altogether. Some schools never use it, others only very seldom; all only as a last resource, in certain cases only. Only the cruel teacher at present resorts to it. The growing kindness of the age is for abolishing it altogether. It is violent, cruel, might give rise to permanent injury, offends against modesty, degrades those who receive and those who give it, a disgrace to those who give it and to those who witness it. It gives rise to wilfulness, revolt, produces slavishness and breaks the will. It is arbitrary, unnatural, brutal, cowardly, ineffective, produces opposition between teacher and taught. Hence most people are agreed that it is bad. But there are very special occasions when it is wanted and in any case it is better not to abolish it wholesale; for the fear of it must remain even though the fact is abolished. Hence certain rules are framed for its proper administration. It is to be inflicted for moral delinquencies such as disobedience obstinacy, vice and not for intellectual faults. 2. Don't inflict it while you are in a passion, 3. Only the headmaster should do the caning. Let the cane be kept in a bag and not be shown publicly. 5. Do not strike with the hand. The time devoted to taking the cane gives scope for second thoughts. 6. Boxing the ears is specially prohibited.

Rewards. As punishment inflicts pain, reward gives pleasure. A child may be incited to endeavour by many different motives. 1. By the desire to get something, for some tangible rewards. 2. For distinction and to excel his fellows. 3. To win approbation from parents and teachers. 4. Out of a sense of duty and pleasure in doing the right. These motives are arranged in an ascending scale and the 4th is the highest motive. The first has an element of selfishness, and covetousness, the second is akin to vanity and even the third is not perfectly pure. The first therefore is a very low motive.

Hence even if rewards are offered they should not take a material shape and be costly as books or money. Therefore praise, marks, positions of honour and trust are the only ones that are unobjectionable. Even these are objected to on two grounds. First that the desire to excel is not a worthy motive and leads, to envy, jealousy, rivalry and competition. Of course the ambitious motives have both their good and their bad sides. Next we are appealing to a low motive. This has to be, as we appeal to a low motive where a high one is not available. Therefore rewards should not be in the nature of bribes to secure good conduct on particular occasions but must be rewards for labour over an extended period. In this way they would serve the purpose of training. To avoid the inferior motive we must see that it is not definitely aimed at and hence it is to be a surprise. Rewards should be for minor morals only e. g., neatness, punctuality, industry. These pay in life also. But truth telling, honesty, politeness etc., should not be rewarded. Reward for superior mental gifts is a doubtful proceeding as it brings in the world of strife and jealousy into the class room. *Forms*, 1. Praise should be wisely given. If limited in supply it has value; otherwise it is quite valueless. 2. Prizes when given in the annual ceremony stimulate rivalry. The unsuccessful are disappointed and jealous. 3. School privileges. 4. Decorations. 5. Place taking rouses emulation, favours the gifted and makes the poor scholar desperate and indifferent.

III. *The Social Level.* Here conduct is controlled by the expectation of praise or blame and this is the stage when self-government should be allowed. Teachers shy at giving self-government to pupils. They are afraid that there would be indiscipline and that the second stage would be worse than the first. Beside it has been found that the boys are very hard upon each other and the punishment seldom fits the crime. The prefect system and the school republic are the ways in which self-government has been usually exercised. But every teacher should enlist on his side the school public opinion. Thus in the case of unpunctuality the following method can be tried. Instead of scolding, nagging, and jawing, at the beginning of the year the class might be shown the record of attendance of the previous year with a suggestion that the present class would improve upon it. Then any pupil who comes late would incur the odium of his classmates. In this way the problem of discipline would solve itself and the boys would be on the side of law; and discipline would be taken away from the hands of the teachers.

IV. The ideal level is reached when such behaviour is adopted not merely by classes but by individuals and made their very own. With this object it is customary to place great models before them.

A word must be said here about the growth of the doctrine of free discipline. Dr. Adams marks three stages (*Mod Developments* chap. 12). The first is the time of the floggers, the rule of the phlebotomists as Southey calls them, when instruction and the rod were inseparable. Famous floggers were Busby who had flogged every great man of his generation, Keate who once flogged a battalion of boys all night. (Ballard : *Changing School* chap I). Th's made the school a purgatory for boys so much so, that Lord Millais the great painter had only been two days at school, being sent down the second day for biting the hand of his master who was about to flog him. The next stage is said to be the day of the impressionists chief among whom, were Arnold and Thring. Without repressing pupils in a savage manner, they yet dominated them by their masterful personalities. The boys became replica of their masters and were not themselves. The modern educationist thinks this quite unjustifiable and votes solid for emancipationism on the part of teachers. The Montessorians are a perfect example of this belief. The teachers are directresses and so efface themselves. They have carried out to the full the doctrine of Froebel that education is a passivity, a following. They are not categorical and they are not interfering. As a result of their doctrine pupils are often allowed to govern themselves in some such manner as the George Junior Republics. In some schools such as that of Tolstoi's at Yasna Polyana freedom has almost led to anarchism. At any rate the growth of the idea of freedom in Education (See Keatinge ; *Studies* Chap. VII) has had a repercussion on theories of discipline and punishment. Things have gone so far, that it is said, that if a boy breaks anything he is not punished, but his teacher gives him his watch to break This impresses him so much with the heinousness of his own offence that it teaches him to take care of things.

Method.

Burnett : Essentials Chap. V.
Bagley : Educative Process Chap. XVI.
Jones : Principles Chap. VI.

There is the great world outside and the mind within. It is the teacher's function to bring the two into relation one with the other, by interpreting the world to the child. The function of method is to aid in this process of interpretation. The means which a teacher uses to interpret to the child the world of sense, of thought and of action are called his methods of teaching. Method achieves the teacher's aim and is most effective. For instance Lancaster's monitorial method made such short work of the difficulties of the three R's that a parent who remembered his own trials, observing the ease with which his son was learning, complained to the pastor that the teacher was obtaining the help of the Evil One. Order is of the essence of method. A place for every-thing and everything in its place, is a good motto for the classroom. The teacher should not merely have arranged in order his lessons for the whole year, but each individual lesson should disclose orderly arrangement. This has a secondary influence on the orderly habits of the pupils and prevents sloppiness in their work. But apart from neatness, method means the intelligent construction and development of a lesson. To define method therefore is to give a detailed description of the procedure to be followed in teaching any subject.

We have said that in the educative process, some experiences are acquired in the concrete while others in a condensed fashion. The methods by which concrete experiences are transmitted, are imitation and objective teaching. The methods by which condensed experiences are transmitted, are either indirect i. e., the method of instruction or direct i. e., the method of development. That is to say, judgments can be transmitted in the preformed or ready made shape by means of instruction, or the individual may be placed under conditions which will enable him to form them for himself *de novo* on the spot. The indirect method largely depends upon telling while the direct method is mainly a development method and as such an inductive method. We have already seen that the inductive method is the more desirable method in education, but that too much stress has been laid on distinctions between the inductive and the deductive methods. The only method for the teacher is the method

by which mind adds to its knowledge. This is neither by induction alone nor by deduction only. Both are wanted for the discovery of truth, as both legs are wanted for walking. For this composite method no convenient term has yet been forged, inductive —deductive is clumsy and so is analytic—synthetic. Perhaps "psychological method" would do as a tentative title. With all that, in certain lessons the teachers may have to lay stress on the inductive methods while in certain others on the deductive methods. In inductive teaching the pupil is led to discover truth for himself. He does this 1. By employing his senses on the material put before him (observation) 2 Noting differences and similarities (discrimination and analysis) 3. Classifying and naming (synthesis) 4. Abstraction and generalisation (principle) 5. Application (verification). Deductive teaching consists in the testing of the truth of a generalisation indirectly reached either by him self or by earlier discoverers by applying it to new instances.

No doubt the judgments one makes for oneself arc far more efficient than those borrowed from others. This is why Rousseau said that Emile would be told nothing, but that he will be called upon to invent the whole field of science, the microscope, the telescope and every other kind of scientific invention. Now this is going too far. No one will have the time and few will have the brains for such a task. The child cannot literally be made to repeat the history of the race. We have a wonderful race heritage, which we can acquire without going into all the mistakes the race had committed in acquiring it. By organisation, selection and rejection, the task of centuries can be crammed into so many years. Therefore the telling method which gives such preformed judgments has also a place in education. So far as *facts* are concerned, it is still the best method in teaching. The facts of history and geography cannot be experienced by the individual and so should be taken on faith from the testimony of others. But certain facts such as the conditions under which seeds germinate, may be discovered by the pupils for themselves, for then they make a greater impression and gives them certain useful notions as regards the place of observation and experiment. On the other hand *principles* should not be borrowed second hand. They should be made on the spot by the pupil himself if they are to function efficiently. "General truths in order to be learned should be earned." The teacher should supply the data, arrange them in such a manner as to lead to the generalisation or principle and leave the pupil to arrive at it by reasoning. The teacher should never do the

reasoning for the pupils. The right of generalisation from particulars and the right of inference from generalisations belong to the pupil. We have already said that the child has neither the time, nor the capacity to re-discover all scientific principles afresh. Therefore when we say that the right of generalisation belongs to the pupil we only mean that he should not be told but should be made to see. The teacher should be a guide and arrange the materials of instruction in such a manner that the principle will be precipitated before the eyes of the pupils. The teacher should help by means of hints, suggestions and questions, but should not do the reasoning for the pupil. Thus the modern geography teacher is no longer content to make his lesson an exercise in memorising mere catalogues of names of capes bays, towns etc. Rather the geography lesson has become a valuable exercise in observation and inference both deductive and inductive. The teacher no longer gives a fluent discourse as to why New York is great; but so manipulates matters that the pupil is made to see for himself why it is great. Regional geography and rational geography are more reasoned than descriptive sciences. At the same time we should admit that there are many cases where the inductive method is not applicable. In most history lessons the inductive method is inapplicable. If the pupil has not the previous knowledge it cannot be educed out of him, but should be told. The deductive method may be applied partly. From the given conditions of a time or the character of a monarch certain other results may be deduced and verified by relation to actual facts.

The Objective Method.

Bagley : Educative Process Chap. XVI.
Jones : Principles 189—191.
Dumville : Teaching its nature and varieties Chap. VI & VII.
Adams : Herbartian Psychology Chap. VII.
Colvin : Introduction to High School Teaching. Chap. XII.

We have frequently emphasised the fact that all knowledge begins with the senses and that therefore we should use things before words. The fact to be noted here is that primary ideas must come from personal contact with objects, that is contact through the senses. The method which uses objects to present ideas is called the objective method. We should distinguish it from the Illustrative and the Laboratory methods. A teacher may tell a child that $2+3=5$ and use

objects to illustrate; but if he provides the child with splints and tells him to count out two in one group and three in another and then allows him to discover that two and three are five, he uses the laboratory method. Again when an individual seeks to find out truth by the objective method, he may experiment with objects composing, decomposing or manipulating them, so as to make them give out a truth. When the individual is carrying on the experiment he may be using the method of discovery; when the experiment is made for the class it becomes the illustrative method known as demonstration.

We should note that the scope of object teaching cannot be very great. Object lessons owed their justification to the Pestalozzian pedagogy, their popularity to the thirst for information displayed by people during the middle of the nineteenth century and their disappearance, to the great vogue of Nature study, which is its successor (Ballard: *The Changing School* Chap. 17). All matters cannot be studied in their concrete setting. Object teaching is prominent in the elementary grades but is conspicuous by its absence in the High School. This is only right, since we cannot always remain in the concrete. A few experiences with the concrete will enable the mind to make the abstractions which would enable it to be free of the concrete. Again object lessons can be successful only if the mind of the pupil had been adequately prepared. This follows from the law of apperception. We observe with what is already in our minds. This is why the world fairs and exhibitions do so little good to the general public. To a few specialists who have limited themselves to a narrow field, the exhibits in that sphere do a great deal of good. On the common person who "does" these shows since it is the vogue to visit such exhibitions, they leave but a vague impression. Further the pupil should be required to report in some form the results of his observation. Observation should be coupled with expression as otherwise, the necessary effort and attention would not be put into the observation. The report supplies the activity on the part of the learner who would otherwise be merely passive. Finally object teaching is a means to an end—a means by which some fact or principle relatively abstract could be acquired. Hence too much attention should not be attracted by the object itself, as this would distract attention from the fact or principle which is the end This is one of the defects of the kinematograph as an educative agency. The pupils are too much interested in the pictures themselves to see any further

meaning. Moreover the presence of an object prevents the activity of the mind which would otherwise have been exercised in envisaging the absent object. The heterogeneous knowledge acquired through object lessons, lacks organic unity and is incoherent and fragmentary.

The school excursion is a type of object teaching. For the study of geography, history and natural science it is an invaluable aid. But good care should be taken in organising it. There must be a definite end in view, such as observation of the course of a river. The teacher should go over the ground first and then prepare all the points which have to be observed. These should be before the pupils' mind during the excursion. In the course of the excursion the pupils should be gathered together now and again and led to consider certain points. In the end, the pupils should be asked to sum up their observations. It should be distinctly noted to be a class lesson and not a picnic. In the excursion the pupil is brought to the object, in the museum the object is brought before the pupil. There was a time when museums were looked upon as specially suited to the teaching of certain subjects. One Isaac Habrecht said "one would learn to know all the animals of the world more quickly by visiting Noah's Ark than by traversing the world, and picking up knowledge as we went." Dr. Adams has something trenchant to say on this Noah's Ark way of teaching. The caged animal for example is a very different specimen from the wild variety. The pupil no doubt will be able to see the details and to associate the name with the object or thing; but much more than this cannot be learnt from a caged specimen. To learn more you should see it in its native environment. From this point of view a school museum would be better as in the course of collecting the specimens, the pupil would have learnt a great deal about them. Here also it is necessary to have a definite end in view. A museum contains such a wealth of material that it is idle and profitless to have a general inspection. The pupils should confine themselves to one section and specially for finding illustrations to matter already well known to them. Thus a class which has studied the geography of South America, may be taken to that part of a museum containing South American exhibits.

The Telling Method.

Adams : The Students' Guide Chap. 8.
Dumville : Teaching its Nature and Varieties Chap 3.
Jones : Principles pp. 237-241.
Colvin : Introduction to High School Teaching Chap XI.
Burnett : Essentials pp. 100-106.

The simplest view of teaching is that the teacher knows something and tells it to the pupils and teaching is taken to be the oral communication of information. This is not merely the simplest view but the most common view. Young teachers especially are under the impression that teaching means telling. But telling is such a defective method that among educationists the saying is common that "telling is no teaching" and Herbert Spencer laid it down that "children should be told as little as possible and should be made to discover as much as possible". The first part of Spencer's dictum is due to the shortcomings of the Telling Method, the second to the merits of the Heuristic Method or the Method of Discovery. With all that, we should admit, that telling has certain advantages. First of all it tends to secure and hold attention. The human appeal and the spoken word carry greater emphasis than the mute appeal of the books. Secondly, it is directly adaptable to the immediate needs of the class. One of the handicaps of book instruction is that books can never be planned primarily to suit class needs and much less to suit individual needs. Whereas the teacher can suit the instruction to the capacity and receptive power of his class and of individuals in the class. Lecturing is said to be an animated dialogue with one party left out. The lecturer takes his cue from his audience. Emerson, used to say, that the audience sent up in dew what it got back in rain. Thirdly, the information supplied by the teacher is bound to be more up-to-date than what can be got from any one particular book. Books get out-of-date very soon; and no one book can ever deal with a subject from all points of view.

At the same time no one can gainsay that in this method the defects far outweigh the merits. Firstly, it is time consuming. The teacher is wasting his time in explaining and making palatable material which the pupil can find for himself from the books. Secondly, when the teacher thinks from the way the students had been interested in his class, that they were assimilating the subject matter, they are really interested in the teacher's presentation and not in the subject itself.

Thirdly, the Telling Method cannot fall back on a permanent record. What the pupil hears may fall out of his memory soon. But in the case of text-book instruction what the pupil does not understand may be referred to again and again and comprehended at last, and what is forgotten may be read again and remembered.

Another handicap of the Telling Method arises out of the use of language. Language can be understood only when there are corresponding ideas. Now these ideas are arrived at in each man's case individually. The child's activity brings him into close familiarity with his physical environment. Such experience together with echoes of people's conversation establish associations between things and words. The experience behind the word is different in different cases and so the meanings summoned to consciousness by each word may be richer or poorer. Such considerations indicate the difficulty of presuming the existence of corresponding ideas. The absence of corresponding ideas may be illustrated from a stranger in a strange country asking the way to the Post Office. He is told that it is next to 'Green's cottage through Parker's field". How can he find it out because he knows neither Green nor Parker and their whereabouts. Therefore in explaining one thing in other terms, we should see that those terms are more common to the listeners. Again even though we may have the corresponding ideas of single words, it is not likely that we shall have the thought links of composite ideas. Words coalesce in a sentence to form definite meanings, and therefore to know the words is not to know the meaning of the sentence. Now such sentences affirm or deny other matters which themselves represent particular experiences in this world. Thus the word *black* has one meaning and *bird* has another meaning, while *blackbird* has a third meaning which represents something very definite. In the phrase *the present Inspector of Schools* each word has one meaning but the combination points to a particular person. Thus in every case we are made to fall back on experience. The presence of such experience in both cases, depends the possibility of communicating information. Hence telling which is done mainly through the agency of words, would go astray if the words used did not raise corresponding ideas in pupils. A second caution that the teacher should keep in mind, is concerned with the kind of words employed. We should suit the word to the particular hearers. With very young children if we say "Huxley's most distinguishing characteristic was his passion for absolute veracity," they may not understand what we meant, but, if we say

"Huxley always tried to find out and tell the exact truth," they will. Hence we should use the most familar words having the most unambiguous meanings. If we are addressing a mixed audience, it is always good to adjust our speech to the least enlightened among them.

Telling when carried on uninterruptedly for any length of time is technically called lecturing. Lecturing is a most unsatisfactory method. The wearisome sameness day after day, the mental inertia of the students, their passive receptivity, the absence of cooperation between teacher and pupil, are some of the obvious defects. It is suited only for adults and even for them a number of cautions should be kept in mind by the lecturer. The information which is to be imparted should be reduced to order so that it could be presented systematically. If we dodge in between the several parts of the subject, we are likely to create confusion in the minds of people to whom the subject is new. At times one part of the information is dependent upon the knowledge of some other part, in which case the second should be given first. Instead of this some speakers keep on saying "I should have told you this first &c. &c.". The next caution is that we should realise that it takes time for the hearers to assimilate the information they receive. Therefore the rate of speaking should be slow, measured, considered and deliberate. Most lecturers however are far too rapid. Hence pupils should be asked to come prepared to the class. Lectures should not be taken on an empty stomach. Next we should remember that even if what is heard is assimilated, it begins to fade away rapidly and portions of it might disappear before we reach the end. If these are essential parts of the discourse, the thread might be lost, such portions should therefore be emphasised by loud, deliberate, impressive statement and by repetition. Such repetition should be varied because variety charms and a change in form may disguise the fact that we are "hammering away" at the same thing, while it may help in every one's assimilating, as some assimilate in one form rather than in another. But even such repetition is inadequate with little children with whom we should have sectional revision. Children should be asked to repeat what they had heard. The teacher will thereby know whether what he said, had gone home. Its main purpose however, is to keep before their minds necessary parts of the lesson which unless so revised may disappear. Repetition welds the parts together and making the boys recall is a very good way of fixing the information in the mind. Listening after all is passive; repetition is active and produces atten-

tion. The teacher should also pay attention to his voice. His enunciation should be clear and distinct; his pronunciation, standard. A pleasant and musical tone gives pleasure. Loudness should be adjusted to the room but he should be loud and audible enough. He may find out if he is being followed by means of suitable questions.

The only way to avoid what is heard leaving the mind in a short while is to take notes. There are four different ways of note making. 1 The verbatim report. To do this a knowledge of shorthand would be necessary. But not all parts of a lecture are equally worth taking down. The difference between an essay and a lecture is that in the latter we are brought in contact with a living personality. If we are taking notes all the time, we are losing the benefit of this advantage. 2. The dictation method, i. e., taking down as much as possible in longhand. This is most pernicious in its effects. In trying to catch the words, the student loses the meaning. Handwriting degenerates under the strain and it is almost impossible to decipher what had been taken down. 3. The third method only takes down striking words and passages and title headings. This permits of intelligent listening. But unless the notes are re-written and filled up when the lecture is still fresh in the mind, they become useless. 4. The skeleton outline method. All good lectures are constructed upon a definite plan. The pupils take down the heads and sub-heads of this plan and are able to fill out the lecture because everything is logically developed. (See *Adams* : Students' Guide Chap. 8).

We have seen that telling has certain advantages over text-book instruction ; but that text books have their place in education. It is the text book that gives the skeletal outline to the courses of teachers, which they have to clothe with flesh and blood, by their telling. The text book further is adapted to the mental and educational status of the pupil. It gives a complete view of the subject and is systematic in its treatment. It supplies the permanent record which is lacking in pure telling and is portable and convenient for use. Hence to know how to use text books, so as to get the best out of them, is an art which the teacher should know. First of all he should know how to select the text book. Text books should suit the grade of instruction. A text book, however excellent for the elementary school may yet be unsuitable for the secondary. Text-books should be up-to-date in their information. According to the needs of the subject, the matter should be treated properly, such as by

means of "stirring narration, vivid description, clear exposition, appropriate and progressive vocabulary and direct attack." Accuracy and adequacy of treatment, number and appropriateness of illustrations, maps and diagrams, size of type, length of line and spacing have also to be noted. Pupils should be saved from the danger of mistaking the text book for the subject. The teacher should therefore supplement the text book (1) by oral instruction (2) by reference reading. Just to read another book on the subject is often to clear obscure points in the text. But reference reading should not be aimless, lest it swamp the pupil's mind. Boys should be sent to books with specific problems to solve and note making is unnecessary. (3) By all the concrete methods which we speak of under illustrative and objective methods. Teachers should be given a free hand in the selection of text books. For this purpose the practice of approving a number of books leaving it to the teacher to select his own, is good. (Ruediger : *Teaching Procedures* Chap. XVI).

The Five Steps

Findlay : Principles Chaps. 12-15.
Adams : Exposition and Illustration Chaps. III to VIII.
Jones : Principles pp. 248-254.
Raymont : Principles Chap. II.
Dumville : Teaching its nature and varieties Chap. 8.
Bagley : Educative Process Chap. 19.
Burnett : Essentials Chap. 8.
Hayward : The Student's Herbart.

Whatever lesson we teach, on analysis we shall discover that we have followed a definite method in which could be distinguished five steps. The steps are the means psychologically speaking, by which the mind adds to its knowledge. Though good teachers of all ages used these steps unconsciously they were definitely formulated by Herbart and elaborated and defined by his successors. Let us now see how these steps make themselves apparent in an ordinary lesson. The lesson is to teach a convenient method for squaring two place numbers. The teacher would naturally refer to the common method of multiplying the number by itself and point out that this is a cumbrous method and that therefore some easier method would be necessary. This step would correspond to the Herbartian step of preparation with the substep the statement of the aim.

Presentation. The teacher would then present the new method by which, say he would square 23. There are two

tens and three units in 23. Let us take 3 units away and we have 20. Let us add 3 units and we have 26. Multiply 20 by 26 and add the square of 3. We get 529 which is the square of 23 arrived at by the multiplication method. Here the method of teaching is by question and answer, the matter being elicited from the class,

Comparison. Now we take a number of cases in which the use of this method gives the correct answer $31^2 = 30 \times 32 + 1^2 = 961$.

$$42^2 = 40 \times 44 + 2^2 = 1764$$
$$55^2 = 50 \times 60 + 5^2 = 3025$$
$$67^2 = 60 \times 74 + 7^2 = 4489$$

By comparing the method by which we arrive at the square every time, we discover the unity of the process. *Generalisation.* In the next process, we isolate or abstract the common element and formulate it into the rule " To square a two place number, multiply the number minus the units by the number plus the units, and add the square of the units". *Application.* We then apply the rule to several new cases thereby raising it to greater clearness and at the same time learning the use of it.

These are the five steps in an inductive lesson often called the inductive-deductive lesson because the last step is purely deductive. It is also the Development form of instruction. In the Development method the learner constructs the knowledge in his mind by his own experience. If it is a general truth, or a law or a principle or a definition, he himself arrives at it, and so it becomes part of himself. He can apply it and he becomes self reliant and hence some have advocated that all lessons should follow this course. We shall consider this claim presently. Meanwhile we should say that in case of principles at least this procedure should be always followed, "General truths in order to be learned should be earned".

Preparation Since preparation is the name given to work done out of school hours, this step is often called the Introduction. Preparation, here means, however the preparation of the mind to receive the new knowledge. We have said that previous knowledge is necessary for the assimilation of fresh knowledge. This is the fundamental principle of apperception. The preparation step is meant to evoke the apropriate apperception masses. Thus if it is to be a lesson on adverbs the lesson can be possible only if the

pupils have some knowledge of grammar, and of parts of speech The prepartion is meant to assure the teacher that the boys know this preliminary knowledge and to arouse it clearly to their minds. Where it is vague it should be made definite, where inaccurate it should be made accurate. Thus the preparation step makes the apperceptive systems explicit. This is the *intention* of the preparation. The *content* of the preparation is previous knowledge and so it would contain no new knowledge. It might be the recapitualation of a previous lesson, if not in its entirety at least in its salient points. But it need not be the previous lesson at all and may elicit matter which had never been mentioned in the class before. It may be on correlated topics from other subjects, or it may belong to a circle outside class teaching, and might belong to the pupil's interests of a homely nature. The *form* of the preparation is by question and answer. It has to be completely the pupil's work and so he must be guided to bring out his apperception masses by well directed questions from the teacher. The *time* to be spent upon this portion of the lesson should be very brief. The aim being to rivet attention on the subject in hand, the teacher must control the discussion in the class with that aim in view, and prevent it from wandering all over the place as it would if it were long. If the teacher knows the class well, or if the lesson were well articulated with the previous one, the preparation might be very brief. Thus if the teacher asks in a lesson on coffee "what did you breakfast upon ?" in the hope of getting the answer "coffee" he might engage himself presumably upon a wild goose chase. But if he asked the question pointedly "instead of tea what does your mother often give for breakfast" he might waste very little time in getting the answer.

Hindrances to a good Preparation. 1. It is difficult to teach strangers for it is difficult to find out their apperceiving ideas. Therefore it is good that the teacher is confined to a class for a long time together, so that he might know his class well. This is why substitute teachers are a failure. They have only the general guess as to what the apperceiving idea of a certain class of boys usually is. A poor teacher who knows his class for a long time would even make up for his poor teaching ability. 2. It is difficult to teach multitudes because the apperception mass of each is different. This does not matter very much in the lecture, where the speaker addresses himself to the average apperception mass : but in teaching, each boy has to work out its own success and so the teacher has to know each mind singly. 3. Very often the necessity to prepare for examination leads to the first step

being scamped. So much has to be got up that the foundations are not thoroughly well laid. 4. To some a fact is new, to others it is old. Some students are so dull that what is old does not readily rise above the threshold of consciousness. To be for ever revising old knowledge is wearisome, to leave the enemy unconquered in the rear, is dangerous.

The information obtained thus from the pupil by analysis must be sifted and regrouped and formulated as a definite aim. There has been some controversy over this matter. Some have suggested that the teacher should hide the aim of the lesson from his pupil as long as he could, and then spring it upon him so that curiosity may be roused and the final impression might be great. This is not correct. Curiosity might no doubt be aroused, but it would not help towards the mastery of the lesson. Besides there is nothing more fatiguing than trying to follow what the speaker is driving at. A good aim would be a standard by which to judge the worth of what the teacher says. The pupils would be able to say then what thought deserved their attention. Hence it would rivet attention. The statement of the aim also reveals a problem and hence the need of the new knowledge. It thereby entails the interest of the pupils It really forms the connecting link between the old and the new and fulfils the conditions of apperception. The aim therefore should be pertinent and definite and not vague. It must be concrete, brief and attractive- It must be expressed in clear language. Thus a preparation for a lesson teaching evaporation after eliciting familiar cases of evaporation may state the aim as follows : " we shall now find out *why* the steam condenses on the glass etc." Here it is pertinent, reveals a need for the knowledge, is concrete, is brief and attractive. But the statement of the aim for a lesson on the Crusade as the First Crusade is not concrete, nor is it clear and therefore it is vague and would not enable the pupils to rivet their attention on it.

The Step Presentation.

The intention of this step is individual as opposed to the universal, is concrete as opposed to the abstract. It aims at giving particulars before generals, percepts before concepts. In this way it is contrasted with the other steps. One of the features of a good presentation is that the new should be joined to the old. This is to fulfil the requirements of apperception 2- The material should be subdivided into sections which logically follow one another and are thus well articulated. This is known as the law of

successive clearness. 3. The individual sub-section should at first have attention devoted to it. This process is known as absorption. Then each section should by means of revision be connected with what went before, and thus its place in the whole lesson should be indicated. This is known as reflection. Thus at one stage the class will notice the particular aspects of the Indian peninsula, and then it would notice the relation of it to the Eurasian continent. Observation, particular observation and varied observation, will be the characteristic feature of this step. 4. The order of presentation should be psychological and not logical. Thus in history, the teacher must start with what is known to the pupil rather than follow the chronological order. 5. This step should also be characterised by vividness, emphasis, repetition and interest. Hence there should be pictures, models, illustrations etc. There are varieties of presentation. Most often it is telling and is known as narration. Sometimes it is experiment as in the natural sciences where the pupils discover the truth for themselves. A third method may be called the development method, in which the teacher leads the pupil to think out the situation for himself and by skilful question and answer, enables him to travel on the road to new knowledge.

The Third Step Comparison.

The mind does not stay in the details. It seeks to see likenesses and differences and to form classes. It wants to make uniformities out of variety and thus to arrive at law, principle, generalisation or universal truth. The spade work for this is carried out in the third step comparison. In certain cases it is not possible as e.g. with little children, because children are not capable of abstraction. Where comparison is made, we should make sure that the two things compared are well known, and we should see that only those comparisons are made, which are really valuable in the sense that they make the pupil think. It is undesirable that this step should be sharply distinguished from the previous one. At times the student would have the generalisation isolated even during the presentation. But the necessary examples which should be considered before the generalisation is precipitated is left to the judgment of the teacher. In some cases many examples would be needed, in others few, but in all only by the Law of Varying Concomitants, is the generalisation isolated.

We have said that this step is inapplicable in the case of children; it is very apt in Mathematics, Natural Science

and Grammar. But in the case of the Humanities there is not so much scope for it. In history or literature teachers would be satisfied if they achieved the first two steps and would be glad to leave the third step, to such times, when out of the plenitude of his knowledge, or when the pupil is really grown up, he might make his generalisation.

The Fourth Step Generalisation.

The unities abstracted during the third step are then put together in a unified form which might thus form a rule, principle, law or definition. The pupil must first he given a chance of making it and then it should be given shape and form by the teacher. It would then be added to his possession as a general truth. The form in which it is put adds to its revival value. It should be briefly and clearly expressed. The time spent on this step should not be great. It should be an answer to the problem or question propounded in the aim.

The Fifth Step Application

The mind moves from particulars to generals and from generals back to the particulars. We have reached to the universal from the individual, now we shall have to apply the universal again to individuals if we want to make it clear to our mind and be in a position to use it. Unless a general truth had been earned it does not become a permanent possession, unless it it applied it never becomes part of our intellectual store. Knowledge is for use and this step puts it into vital connection with the needs of daily life, the application may take several forms. It might mean the making of a model, the drawing of a map, the writing of an essay, the working of additional problems etc. By application we secure the activity of the pupil and we know that knowledge is power only when it is put to use.

The Herbartian steps are not applicable to all lessons. It is appropriate only in the teaching of general truths. Even here some very important general notions such as the conception of the earth's rotation, the molecular theory, and so on, are too difficult to derive out of the child's limited experience. They are inapplicable to such lessons as deal with particular facts themselves, as in the case of observation lessons. 3. There are lessons which deal with moral and aesthetic truths which cannot be derived from other facts. These have to be told. In other lessons which do not

deal with such general truths, but yet deal with concrete truths, which are but parts of larger and more comprehensive truths the five steps are not applicable. 5. In lessons which aim at the formation of skill rather than the acquirement of knowledge the practice, imitation and the repetition are more needed than the truth about them. 6. There are lessons which involve much telling on the basis of ideas which the children already possess. The old ideas are summoned and recombined but no new truths are arrived at. In such cases the five steps are not very useful.

The Deductive Development Lesson.

We have already said that there is only one method for the acquisition of truth—the inductive-deductive method. The Herbartian steps are inductive-deductive, the last step, application being purely deductive in character. Yet induction is so prominent that it has come to be known as the Inductive Development Lesson. It proceeds from facts and particulars to the enunciation of principles, definitions, rules and laws. The Deductive Development lesson works in the opposite direction, from principles back again to the facts or less general principles. Its function is twofold, inference from principles and explanation of fresh instances from proved principles. The former is anticipatory, the latter explanatory. For example in the earlier portions of the school course principles of climate may have been learnt, and with their help the climate of any new region such as the Andes region may be "developed' by the pupil. Reference is then made to the text books for the sake of verification. Such a method has many advantages over the purely "telling method", by means of which the climate of the Andes region will be given by oral transmission, (1) it introduces organisation, the detailed facts being joined together in a system (2) it makes the principles previously learned meaningful. To use them in this way is to know them (3) it makes the pupil search out data for himself (4) it brings into education the pleasure of 'problem-solving, (5) it opens the way for further study along the same lines. Thus armed with a few principles anyone can learn the entire geography of any region (6) application widens and clarifies the principle.

In the anticipatory type there are four steps (1) data (2) principles (3) inference (4) verification. Taking the lesson on the climate of the Andes region the data can easily be gathered such as the general lie of the land, its elevation,

its location, its proximity to the sea. These facts can then be interpreted by means of principles and in the next step certain conclusions can be arrived at which can finally be verified by consulting text books, encyclopaedias and other sources. The objection usually brought against the method is that it encourages guessing. But all scientific advance depends upon intelligent guessing. Objectionable guessing is, if you are asked some question the answer to which you do not know and make a shot at random. Guessing in the better sense of the term is jumping to a conclusion on insufficient grounds but with a full knowledge of the uncertainty of the result. This sort of guessing is a step towards the solution of a problem and is not to be discouraged.

"The golden guess
"That's morning star to the fair round of truth"

In the Deductive lesson of the explanatory type facts are explained by bringing them under generals, classes or principles. The lesson in analysis is a good example of this type. Each sentence is divided into clauses, named, and the function explained. In this type also the same four steps are to be observed. Suppose in Geography the essentials of a good wheat country have been arrived at by inductive study, in the data step we take up a fact such as the capacity of European Russia to produce wheat. We ask why and explain with reference to principles. Conditions of soil and climate determine wheat production. In the verification stage we find out if these conditions are present in European Russia. Both the inductive and deductive development lesson require a class of higher acquirement than the lowest They deal with concepts and principles and therefore are beyond little children whose life is largely lived in the concrete. The reasoning processes that the development lessons involve are only for the comparatively grown up children of the high school classes who have the necessary paraphernalia needed for reasoning. This method is also known as the practical method which says that the principle or law can only be properly comprehended. when it is turned to use. That which is learned as mere principle and remains so in the mind soon becomes dead lumber. Knowledge which we wish to see become fixed and permanent should have an opportunity of functioning and so should be turned to account and applied in practice. This was the method used in the olden days in teaching grammar where the common practice was first to state the rule and then to work it out in practice. In this manner the pupil "learned by doing", the inductions or laws

being made clear by working themselves out correctly in the particulars. The psychological principle on which this is based we have already expounded in the aphorism "no impression without expression; no expression without impression."

The Dynamic Method.

O'Shea : Dynamic Factors in Education.

The necessity to learn by doing has imposed upon education what is known as the Dynamic Method of teaching. The ancient ideal of a static education, which put the learner of life's ways on a seat, and kept him there during his growing years with folded arms poring over his books, is gradually giving way to the dynamic aspect of education. Some very big names in the educational world are asserting that "the child thinks with his muscles", that "every idea has a motor aspect", that "mind is but a middle term between the senses and the muscles" that "it functions for the purpose of guiding conduct". Therefore the child should be learning the world in a motor way and should be doing under wise guidance rather than memorising words divorced from action.

The reasons adduced for this view are many. The natural development of the individual is from motor to mental supremacy. The child is incessantly active. It has been observed that a child of five usually talks about 15000 words in a day and goes through five times the muscular activity of a man. Restraint comes with age. It is the philosopher who can sit still and think of abstract ideas. The construction of the nervous system as we have studied it is against it. In the earlier ages every sensory nerve is connected up with a motor nerve. It is only later that nervous energy liberated by the sensory areas pass into the associative centres. It is likely that it is through these activities that children learn. If we tell them a story their muscles are acting it out. They bark like a dog, crawl like a snake, jump like a frog when they come across such descriptions. This is even true of adults under exceptional circumstances. Thus one who goes to a foreign country learns the manners and customs in an active manner. So does the college student in the university learn the essentials of his environment. This is why the Dramatic Method of teaching has been emphasised. Ballard points out that it is the natural order to proceed from action to thought. The child repeats the race. The savage did not indulge in speculative thought. What thinking he

did, was of a practical order. So too contemplation is foreign to child nature. The child acts first and thinks afterwards. It is only when he is grown up that he thinks first and then acts. In the methods of Seguin the primacy of motor education has been fully demonstrated. Muscular knowledge is absolutely essential for true understanding of anything. Unless you use your muscles upon a thing you do not get a full understanding of it. Ear-knowledge and eye-knowledge came only later. Active knowledge is stored in the kinaesthetic memory and motor activity brings in knowledge by the backstroke.

Rousseau and Locke attacked the old education and tried to show up the shortcomings of verbal teaching (see O Shea p. 85). Reform began in the kindergarten which provided dynamic education by action and by doing with knife and paper, with cube and song, instead of merely by listening from a teacher. But in every subject the dynamic method should be applied. In arithmetic the child can get a thorough grasp of the number idea only by using it in buying and selling, weighing and measuring and in all the other ways in which it is used in daily life. The old way of teaching commercial arithmetic started with excellent definitions of such subjects as banking, insurance, partial payments, equation of payments and then proceeded to give illustrative examples. But until the student made the acquaintance of such problems in real life, they meant very little to him. This is why a practical training is usually given along with the theoretical course. Reading and writing should be taught dynamically. If a child wants to write a letter to a friend, he will make short work of the chirographic difficulties. If children are keen on getting the story out of a book, they dig out words in a dictionary and seek the help of every possible source. People study a modern foreign language much more quickly if they have a purpose behind it such as travelling in the country which speaks the language. rather than for academic reasons. This is a far cry from the learning of Greek and Latin for the mental discipline and for obtaining a practice in facing drudgery. The material for learning should be significant for the learner. This is why in the teaching of English in India we insist that the boy should be and act in the English language; and that everything that we teach him should be directed to the needs of his daily life. He must learn to speak about himself, to speak about things that he comes across in his home and school environment and the common situations that he meets with in the circle of his experience. In short he must actively be doing, with the

language. Otherwise he would be making such mistakes as the pupil who defined a vacuum as "a large empty space where the Pope lives"! The teaching of science, it goes without saying, should be according to the dynamic principle and yet until recently it was very common to learn Physics, Chemistry, Botany and Zoology from a text book and it was considered waste of time for the pupil to spend energy and time over a microscope.

All learning whether in the intellectual, emotional or motor fields is through self-activity. You may know all about the internal combustion engine and yet not be able to drive a motorcár. Aesthetic appreciation is developed by reading poetry, by singing, by playing on musical instruments, by writing poetry, composing music and by painting pictures. Moral force is developed by taking part in real life situations which involve moral choice. Participation, therefore, is the basis for all learning. This is why actvity programmes have been devised for all schools. They constitute the curriculum for the child centred schools. A shift has been made from the subject matter of the text book to the realities of life; from subject matter regarded as an end to subject matter regarded as means. Instead of concentrating attention on the tool subjects of the 3 R's, Dewey based his curriculum on the natural resources of child growth which he found out to be four—conversation and communication, inquiry or finding out things, construction or making things, and artistic expression. If children exercise these interests, they will soon master the tools of reading writing and arithmetic. (Ruediger: *Teaching Procedures* Chap. 18)

The Illustrative Method,

Jones: Principles p. 240.
Colvin: Introd. to High School Teaching Chap. XII.
Adams: Exposition and Illustration.
Burnett: Essentials pp. 229-241.

The Objective Method is only one form of the Illustrative Method which can be said to remove some of the defects of the Telling Method. What is told should be made concrete by means of familiar illustrations. To illustrate is to make clear. Ideas presented in text-books and oral discussions are made clear by illustration. Illustration does this by explaining the less known in terms of the better known. Analogy and example are forms of illustration and we have dealt with them under reasoning (see *ante*). Often the story is used

story can be used to illustrate (1) Stories can be used to manipulate ideas which when read of in text-books are inert and dead. In a story we see principles in action, facts applied to life. So the illustrative story should not be glaringly out of tune with real life (2) Stories may be used for moral effect, so as to lead people to imitate a definite line of action. Most moral stories are of this type. The boy who discovered a pin on the road and got employed for carefully preserving it and such like stories have been used to press home certain moral precepts (3) The third use of a story does not recommend one single line of action but suggests general principles which have to be applied in individual cases. The moral need not be stated but should be allowed to be drawn by the pupil himself. The story is very useful when interspersed with the lecture, even though the connection between the story and what is being said, is not very apparent.

It is commonly believed that things illustrate much better than words, and from this point of view, the several types of illustrations are arranged in the following descending order. (1) The real object (2) model of the object (3) a picture of the object (4) a diagram (5) a mere verbal description. The real object cannot always be presented. Often it is too cumbrous. The model is in many cases much better than the real thing itself. Sometimes the thing is too large and cannot be taken in with one glance, which is possible with the model. At other times it may be too small and a magnified model would be convenient as used by Mr Bragg in atomic study. But we should recognise that a model involves abstraction. Some time the abstraction consists only in size, the model being either larger or smaller, but in every other respect resembling the real object. The model of a locomotive is a smaller representation of the original; but it can be made more and more abstract, as when the fuel burnt is not coal but spirit and the machinery may vary in detail but yet illustrate the general principle of working; or finally it may only be a mere child's toy worked by a spring. Each one of these models being of a different degree of abstraction, has its own purpose in illustration. The clay model of a geographical region may mean many kinds of abstraction and often illustrates only dimensions, though by colouring and contour, it may be used to illustrate strata and elevation. In botany and biology models are useful for dissection. Thus the model of a primrose resembling the original only in form but representing abstraction of size, flexibility, moisture, texture and scent, may yet give a better idea than the original, when it is made of detachable parts. This is the

advantage of *papier mache* or plaster of Paris models of the human body in Physiology. The model of a familiar thing such as the horse often attracts greater attention than the original itself. The great advantage of a model is that unlike a picture, it represents the object in three dimensions. This advantage is to the fore where details are concerned but for the whole view or for aesthetic effect the picture is always better. When the model makes abstraction of the one most striking quality in the original, it fails to impress us. The model of St. Peter's at Rome being a miniature must fail to impress us as the original, which creates its effect by size. With all that, the three dimensional model corrects certain misconceptions engendered by the use of two-dimensional pictures. However weak the globe may be as a teaching apparatus, it has yet the advantage of correcting the wrong notions shown by the map "The world in Hemispheres". While in the teaching of the seasons it becomes an indispensable adjunct.

A picture is more abstract than a model. For one thing it is two dimensional. If it is a drawing or painting, it only represents the artist's impression and not the reality. Even if it is a photograph, the background can only be one while a model can be looked at from several points of view. Again the picture represents the impreseion at any one particular moment. All these tell us that a picture involves abstraction, to a greater or lesser degree. When we come to historical illustrations and imaginary illustrations the disparity between the picture and the reality it is believed to represent, is very great indeed. When the artist has carefully studied the constumes and the things of everyday life of the period he illustrates, the picture may give much detailed information. With all that, it fetters imagination and only helps those who lack that faculty. Since little people are in need of as much detail as can be communicated to them, there can be no harm in using pictures copiously, provided they are true to life so that nothing need be unlearned later on. What can be depicted in a few square inches by a picture, may take many pages of descriptive writing, and the pupil learns at one glance much more than he can, by hours of reading. There fore teachers should devote attention to the illustrations in text books. When the picture increases more and more in abstraction, it becomes the diagram, the pictorial series in the order of increasing abstractness may be thus summarised;--(1) Realistic pictures in which nothing is left to the imagination (2) Conventional pictures to understand which we should know the key as in the more eccentric schools of painting.

(3) Diagrammatic pictures in which certain conventions are used, as in the isometric system.(4) Diagrams in which the drawing is not like the object represented but corresponds to it in certain points. Examples are plans and elevations and all manner of maps (5) The final stage is the pure diagram in which one fact is represented by another with which it has no apparent connection. Thus the amount of wool exported from Australia, has no connection with the line which represents it.

A diagram is simply a picture, stripped of its unessential accessories, for the purpose of teaching. A picture seeks to reproduce the object as it appears to the eye. The diagram isolates certain relations and by isolating emphasises them and thus frees them from complication with others. The picture deals with things as they appear, the diagram deals with them as they are. The picture appeals to suggestion; the diagram eliminates suggestion altogether. The diagram is not more simple than the picture. The picture is more concrete and the diagram is more abstract. Hence we should begin with the picture, isolate certain elements and study them diagrammatically and then proceed again to the picture and get a clearer view of the whole. A metaphor or analogy becomes very clear when represented diagrammatically on the blackboard. It is however in dealing with statistics that the diagram has its most vivid application. When dealing with enormous numbers of which the pupil may have no real conception, it is better to make them concrete by comparative circles, areas or lines. The comparative areas of India and Great Britain may be represented by inset areas or circles. Often enormous numbers can be made real to the pupils by comparing them with some experience of the pupil's. Thus if we say, that the army of Europe is 16 millions, its enormity may be lost upon the boys. But if we compare it with the 10,000 men who had marched four abreast past them at a military parade and tell them that it would be 2272 miles long and will take 39 days and nights to march past,the size may become real. Distances, the volume of trade etc., can thus be graphically illustrated and made clear.

Certain dangers have to be guarded against, in the matter of illustration. Examples and illustrations have to be carefully prepared. Hand to mouth illustration always leads to confusion at one stage or other. Another danger is that of over illustration. What is clear need not be illustrated. Many zealous expositors go on illustrating illustrations, by

illustrations tangentially, until at last the illustrandum is lost sight of. A third danger is that the illustration often derails the interest from the lines of the main theme. Teachers are familiar with this phenomenon when a specimen or model is exhibited. On such occasions the teacher should not take up the old theme until the new interest has died out. This is the danger of the allusive style in teaching, as it sets the pupil mind chasing the allusion. Often pupils fasten their attention on non-essentials in the illustration. In order to impress the length of London streets the teacher said that if laid length to length they would reach round the equator, from which the pupil got the notion that they will be mostly under water, as the equator passes for a great part round the ocean. If too much of illustration is indulged in, the pupil becomes incapable later on to think about general principles without the help of such illustrations.

The Catechetical Method.

Burnett : *Essentials Chap. VII.*
Dumville : *Teaching : its nature and varieties Chap. IX.*
Colvin : Introduction to High School Teaching Chap. XV.
Fitch : *Lectures on teaching VI.*
Macnee : *Instruction in Indian Secondary Schools Chap. III.*
Ruediger : *Teaching Procedures Chap. 21.*
Raymont : *Principles Chap. XII.*

I keep six honest serving men;
They taught me all I know;
Their names are What and Why and When
And How and Where and Who.

The teacher must be well skilled in the art of questioning for it plays a most important part in the exercise of his craft. To know how to put a good question is to have gone a long way towards becoming a skilful and efficient instructor. Questions serve four purposes within the classroom 1. They can be used to find out what the pupil knows by way of preparing him for some further instruction. This is known as "Preliminary" questioning. The object being to find out suitable points of attachment in the pupil's mind for the new material, the teacher must be sparing in the use of questions. Having put a question which sets the pupils on the desired train of thought, he should allow the answer to be as uninterrupted as possible. 2. Questions are used to discover the pupil's misconceptions and difficulties. This type of question

is useful in all stages of the lesson. By means of the question the teacher can test at any moment whether the pupil's mind is actively engaged upon the material presented for assimilation. 3. Questions can be used to secure the activity of the pupil's mind and his co-operation while you are in the act of teaching him. These are known as "developing" questions. They are most useful in the course of a lesson especially one involving a long chain of reasoning. Here they are used to lead the pupil on from step to step in a course of inference or observation. When a teacher shows the relation between the climate of a country and its productions or when he seeks to establish a grammatical rule or a scientific law on the basis of a number of instances, in short the "developing presentation" in which the pupil is led to think out the matter for himself, must be chiefly achieved by means of question and answer. 4 Questions might be used to test the result and outcome of what you have taught. These are known as "recapitulatory' questions. It is advantageous to pause at any part of the lesson or at the end and call upon a pupil for a connected account of the lesson to find out how far it had gone home. Here again questions should be sparingly used. If the teacher keeps up a "brisk fire" of questions the pupil's answers are disconnected. If we wish to ensure continuous oral discourse in the case of pupils we should give scope for such continuous accounts on their part. Answers in complete sentences help towards this. These four different kinds of questions can be grouped into two main classes, the *teaching* and the *testing*. The first, second and fourth type of questions are testing questions; while the third is the teaching type. The testing type is concerned with ascertaining what knowledge is in the mind. From the point of view of the subject matter, questions are either *fact* questions or *thought* questions. The former ask for data while the latter ask for relationships. Fact questions generally precede thought questions. When the amount of subject matter is taken into consideration, questions are either *piecemeal* or *topical*. Piecemeal questions deal with detail and are followed by topical questions which are summarising questisons. The teaching type of questions causes the mind to learn and "makes interrogation not merely a means of discovering what is known, but a prime instrument in imparting knowledge."

The teaching type of question is so important that it has been exalted to the dignity of a special method known as the Catechetical, or the Question-and-Answer, or the Socratic Method. As such it is a good corrective to the purely Telling

Method which after a short time makes the pupil to lapse into a state of dull passivity. Thereby it defeats one of the main aims of teaching which is to keep the minds of pupils in a state of healthy activity. The best means of finding out whether the pupil's mind is at any moment actively engaged with the material presented for assimilation, is real questioning. The method of teaching by questioning and answer meets all the defects of the lecture method. By using it the teacher can discover whether he is being understood and whether the instruction is suited to the pupil's wants and powers He can also say whether the matter of his teaching is being absorbed into the very tissue of the pupil's minds. Above all in the form of the question of search, it can be used to lead the pupil to acquire knowledge for himself. In this form it was used by Socrates. Questions of this type are real living questions which stimulate thinking. The Greeck philosopher saw that the Athens of his time was full of thinkers who generalized too rapidly without sufficient examination of the data and he set to himself the task of clearing men's minds of illusions and putting them in a more humble frame of mind to receive knowledge. His skilfully framed questions by frequently disclosing their ignorance, purged their minds of dogmatism and awakened the spirit of enquiry. The questions in "the dialogues of search" are arranged in such a sequence that the pupil is skilfully led from point to point to the conclusion of the questioner. No direct information is conveyed to him but everything is got from him. If the pupil makes false answer, it is used to lead him to the correct one. The method is inductive. The boy is made to observe and to infer. In short the pupil is put in the way of learning the truth. The Socratic method cannot be extensively used in the classroom as we can never get out of the pupil what he does not know, such as a history or a geography fact. All that it can do is, to direct thought and observation along certain lines, in which new facts of knowledge can be garnered by the learner.

This shows that the Question and Answer method cannot be used to impart new information and that the apophthegm "telling is not teaching" expresses only a partial truth in a negative way. Telling is in truth a very important part of teaching. New information and knowledge have to be told to the pupil. The true art of teaching is to know when to tell, what to tell, and how to tell. Only our telling must give rise to learning. Again telling becomes teaching only when the ground has been prepared for learning what had been

be the sole method of teaching, it can be supplemented by direct telling. This mixed method of teaching is known as the *Dialectic* method or the method of *Discussion*. We should question to find out how much the pupil already knows about the subject of instruction and to guide and stimulate him along definite lines of inquiry. Alternating with the questioning, there should be an amount of direct telling. Telling as a rule should follow a series of questions in order to give the pupil the information which he cannot discover for himself or to thread together in a concise logical statement the various items of information which have just been discussed by teacher and pupil.

A number of rules may be given for the framing of questions and their proper use within the classroom (1) The question should be clear. The language used should be simple and the meaning of it should not admit of any doubts (2) The question should not be repeated. The argument for repetition is that it gives added emphasis. But it is time consuming. Pupils should be trained to attend. If questions are habitually repeated, pupils would expect the repetition and not attend to the first utterance. Besides the repetition would disturb the pupil's thinking (3) The question should not be rephrased. The question is rephrased because the original form does not satisfy. This should never be the case. The teacher should have thought beforehand and arrived at the best form of the question. The rephrased question generally lacks clearness and since it is stated in various ways, often leaves the class in doubt as to what is intended. The rephrasing and the changing of the form disturbs the pupil's thinking. (4). Questions should be terse. Avoid surrounding your questions with little expletives and circumlocutions, and strip them of all verbiage and periphrase. "Can any one tell me—" "Which of you knows—" "Will those hold up hands who know"—are forms to be avoided (5) Questions should have point and should not be indefinite, vague or obscure. Examples are "what do you notice about these lines?" "What is the most important point that you notice about this object?' What sort of a person was Henry VIII?" What do you know of Edward III?" Now these questions do not ask for anything definite and so may give rise to guessing. Many of them are of the omnibus type and admit of many answers, so that the teacher while getting answers may never get *the* answer that he wants. Some require long and comprehensive answers which are suited only to advanced students and in written papers. The teacher must in all cases so direct the question that he would focus

the attention on the point required and unmistakably lead to it. (6) Questions requiring affirmation or negation for answer should not be asked, because they tempt the pupils to make "shots". Children find out from the questioner whether 'yes' or 'no' is required. (7) Questions which are capable of being answered in single words are unsuitable. An answer in single word does not imply knowledge and hence every answer should be in judgment form (8) Questions to which the answers are too obvious should also be avoided since they give rise to no mental effort. They even perplex. If you ask a boy who knows all about an adverb. "What is an adverb" he feels that there is a catch somewhere, avoids the obvious and goes in search of the occult. (9) Questions which are too difficult to answer should not be asked. This gives rise to guessing. The socratic or the "pumping" question *qua* question has this defect. Besides it wastes the time of the class. (10) The elliptical question or the device of asking pupils to finish answers to questions is also objectionable on the score of giving rise to guessing. (11) Questions should elicit matter logically and sequentially arranged. Questions which elicit matter which is not relevantly connected one with another, leave no definite impression and lead to "scrappiness" in thought. (12) Questions should not be leading or suggestive. Examples are "is Shelley's poetry musical?" "Was Washington a great general?" They are declarations put in the form of interrogations. But even these are permissible when intended to emphasise matter already known. (13) Questions should not be asked in a hurried manner. The "rapid fire" of questions does not give time for the pupil to think. (14) The "multiple question" heaping up known material to help answering one unknown question, is justifiable under certain circumstances. (15) Questions should be set to the whole class, no one being able to say which boy would be questioned. They should also be properly distributed. To get answers makes the class lively. Hence questions should be suited to the mental calibre of the pupils. (16) Great tact should be shown in dealing with answers. When the answering is generally bad it is clear that the subject had not been well-taught and should be re-taught. When there is knowledge, but no disposition to answer or when there is random and foolish answering, the inference is that there is indiscipline in the class. That a question is not answered, does not mean it is due to ignorance. Often the question is not understood; if re-framed it may get an anawer. A half-correct answer is often better than a wholly correct one as it enables the teacher to instil the correct answer. The teacher should therefore always

make use of an answer to teach the correct form. Do not reject all answers which are not exactly of the form that you want. For that reason do not complacently pronounce every answer good. If all answers hoth right and wrong are said to be good, it would give rise to muddleheadedness among the pupils. Some teachers have the bad habit of repeating the answers of the pupils. When this is done to make the whole class hear the answer, it is justifiable. But answers are often repeated only because the teacher is nervous and is afraid of the vacuum that follows the answer to a question. Again, it is often due to the noise that comes from another room that makes the answer inaudible to the class. However, the chief reason is the tendency to repeat an answer preparatory to taking it in, and is only thinking aloud. This is a bad habit and ought to be suppressed. It destroys the co-operative attitude of the class and makes the class listen only to the teacher instead of to one another. (17) Collective answering is deceptive. The progress of the class should be judged by the answers of the poor boys in the class. Hence they should be questioned now and then. (18) Some teachers insist on getting an answer to a question from one and only pupil, who is unable or unwilling to give the answer. Often it involves setting a number of supplementary questions and is generally a waste of time. If one pupil does not answer, pass on to the next pupil.

The Heuristic Method.

Dumville : *Teaching* : *its nature and varieties Chap IX.*
Burnett : *Essentials Chap. VI.*
Raymont : *Principles pp. 173-175.*

"Children should be told as little as possible and induced to discover as much as possible." The extreme application of this dictum of Spencer's, is to be found in the heuristic method elaborated by Professor Armstrong and others. Heurism comes from the Greek heuriskein, to find out; and hence the heuristic method is the method of discovery. It is the method of nature advocated by Rousseau in his *Emile*. In the heuristic method the pupil is to be placed in the position of an original discoverer. He should find out things for himself and should receive as little as possible of dogmatic instruction. He should be surrounded with the concrete situation which should give rise to the truth. The procedure should be the same by which Archimedes arrived at the principle of specific gravity. He was aked to find out the amount of alloy in King Heiro's crown and in the course of this pursuit he arrived at a general truth.

This method has several advantages. What the children discover for themselves they certainly know. It also arouses the mental activity of the pupil. Instruction imposes a passive state on the pupil while heurism involves pupil activity. But it is impossible for children to be original discoverers. All have not the mental ability. Discovery in truth takes place only when the person is acquainted with all previous discoveries in that line. Thus it implies a mature mind with a wonderful apperceptive system. Even such geniuses can discover only a few truths.

Heurism of this extreme type is therefore ruled out of court. But if we look closer, it bears a large resemblance to the inductive method that we have described just now. Instead of leaving pupils alone, we tell them the essential facts. We revive in their minds what is relevant and give them such guidance as is required. We thus enlist their hearty co-operation in their own education. That is the inductive system. It is a half way house to heurism and is a desirable compromise. Even if the pupils could discover everything for themselves there is not the time. When once the pupil had discovered a number of things for himself, then he can be told a number of other things. Children are the heirs of all the ages. They have a right to absorb everything done by their predecessors and their contemporaries. Thus if we want to learn natural science by discovering the laws, we may have to spend a few centuries on the process and yet fail to discover them. But as amended heuristic methods are not merely to be used in the sciences, but in all branches of study such as history and literature. Keatinge's method in history and original map making in geography are of this nature. The task of the teacher is to devise *real* problems. This is specially needed in arithmetic. The question must be real both to the pupil and to the teacher; for the teacher too should want to know. Thus how many pounds of apples are wanted to give each boy in the class an apple is a real question. If the pupils are kept continually at problems from the book, they would consider them a sisyphaean labour. They appear to be a kind of device for keeping them at work. Then the teachers do another mistake. They come forward and explain the problem, thus leaving the pupils only the mechanical calculations. Their object appears to be to produce correct answers. But the products are not so important as the processes. What is useful is the method of attack and the reasoning involved. If we explain, the pupil falls backs only on memory.

The Project Method.

Bode : Modern Educational Theories Chap. 7
Fraser :Psychology and Education Sec. IV Chap 1
Adams : Mod. Developments Chap. X.
Mackee : New Schools for Young India.
Stevenson : The Project Method.
Kilpatrick : Foundations of Method
Collings : An experiment with a Project Curriculum
Thayer V. T : Op. Cit. Chaps 16 and 17.

The old ideal of education as expressed in the motto knowledge for knowledge's sake, is fast disappearing. The old days when students sat up to learn that which none but the learned knew, have passed away never to return. Hence the old methods of instilling information into our pupils are rapidly giving place to newer methods which have in mind the necessity to suit the newer ideals in education. The Project Method is one such Four main currents of educational thought might be said to have brought about the prevalence of the Project Method.

First, the old insistence on memory for information, is gradually giving place to the promotion of reasoning and thought power in pupils. The old problem of education was to see that a certain amount of information lodged itself in the minds of the pupils. In order to do this, Herbart formulated the Five Steps and they serve their purpose with admirable efficiency. The teacher as an outside agency saw to the assimilation of information. He prepared the ground, presented the new material most carefully, associated it with what was already in the mind, formulated it into convenient shape easily carried in the mind and saw to its perfect acquirement by means of application. The information is more or less taken on authority. The boy is not to reason about it. The value of the information for the pupil's life is laid down by the teacher himself and has to be accepted by the pupil. It is a purely passive process in which the purposive element is lacking. The newer five steps is that by which Dewey would make his pupils think. Here the initiative has to be taken by the pupil himself who plays the active part. The pupil feels a difficulty, locates it, looks out for possible suggestions which would provide a solution, reasons on the bearings of these suggestions and finally puts these suggestions to the test by observation and experiment, thereby rejecting or accepting them. The older method while emphasising memory stultified thought, the

newer method while promoting thinking kept memory in its proper place. The older system often led to ludicrous results. Thus a class of little boys had been learning a great deal about gulfs and oceans, islands, capes, &c. and they could give their definitions glibly enough, but when questioned if they had ever seen the earth about which they learned in this manner, declared in good faith that they had not. The newer system, wants to avoid the evils of such memoriter methods and they find the remedy in reasoning. Hence the newer methods give importance to the problem which we saw in Dewey's view is at the root of reasoning.

The second departure of present day education consists in looking upon information as valuable not for its own sake but for its use in the conduct of life. 'Conduct is the touchstone of culture.' 'Education is for behaviour'. 'A man is worth what he wills rather than what he knows.' 'Educatioin is not for the accumulation of information but for the modification of conduct.' Education is the process by means of which the individual acquires experiences that will function in rendering more efficient his future action. This is the newer view. Till now the mastery of information was the end and aim of Education. Information it should be admitted, does modify conduct but this action is not automatic. It requires thought to apply information to conduct. Unless the information is gained in the conduct or at least applied to conduct, the information gathered exists as so much dead lumber. Hence learning by doing, is considered the best method. When the knowledge had been put to use, it becomes part and parcel of the person. Information is valuable only in so far as it can be made over into the experience of the individual. Information obtained in isolation, may not at all function in conduct; but information obtained in conduct is totally absorbed.

Hence the third characteristic feature of modern educational methods is that knowledge of a thing should be acquired in a natural setting rather than in an artificial setting. In this connection we have only to refer to Dr. Adams' humorous chapter on the Logical and the Psychological. Knowledge of animals is not be had by the short cut of visiting Noah's ark but by studying the animals in their natural habitats. This is true of much of what is done in the classroom. There is a certain unreality about what is done in the school. What is learnt may have some *importance* for examinations but they have no vital connection with the

school or you may not. Precious little of it is any use but you learn what ever is useful, only when you leave school." This gives an unreal appearance to the activities of the schoolroom and encloses it in the atmosphere of theoretical interests. Take for example the problems in Arithmetic set by the teacher out of the exercise book. They are not real problems at all. The teacher does not *want* the information that the answer gives and the pupil finds its conditions divorced from the real issues of daily life. Thus salmon sold at prices that roused the scorn of boys who knew the state of the fish market. Walls three feet thick, twenty feet high and thirty feet long could be built in a few minutes, if only a sufficient number of men were set out in the conditions of the problem. Many answers necessitated fractions of men to do a particular job. This kind of practice has led to a reaction and what is known as socialisation requires that the work of the classroom should be brought more and more into accord with real life. Thus if we ask a boy "how long will it take for you to walk from here to Madras ?" it would not merely involve calculation but a knowledge of things as they are. Then the problems solved in school shall have the same incentive and purpose that prompts their solution outside of the school. This is what is meant by natural setting.

The fourth development in educational thought that has precipitated the Project Method, is the priority of the problem over the principle. In the old method the study of the principles precedes their application to a problem. This is not best, we have just now learned. Definitions should come at the end of teaching. General truths in order to be learned should be earned. The law and the principles should be formulated by the pupils themselves. The old method reversed this order : rules first, examples afterwards. In grammar, first the rule then the examples, in geography definitions and then the body of geographical truths, in geometry axioms and postulates first and their deductions later on. The rule that is learnt from the examples is better understood because the learner makes it himself, learns it as the race learnt it, satisfies a felt need.

These are the four characteristics to be found in the Project Method and its definition is nothing more than their explicit statement. *A project is a problematic act carried to completion in its natural setting.* Here the four features above detailed are plain. The project is an act, a problem, in a natural setting which has to be attacked by reasoning rather than learnt by heart, by means of the memory.

The project idea came into education through the teaching of agriculture. Where it was impossible to provide a home farm with its crops and live-stock as a demonstration unit when agriculture was introduced into the high schools, the pupils were asked to carry on "home projects" on the selection of seed, and the growing of crops under actual farm conditions. This often led to considerable reading and gave meaning to what was read by the student. This simple method for providing "application for agricultural knowledge, has now been elevated to the rank of a totally new method of teaching. Three stages in its development may be noted. In the first stage projects were meant only to supplement school-work. Secondly "project" denoted the application of knowledge learnt in school to real life situations and was thus the culmination of learning and not its beginning. In the third place the project was a genuine problem with an immediate appeal to the pupil, in the solution of which he was purposively and whole-heartedly interested. In the first sense of the term it gradually came to mean additional work of an enriching character set for those who had completed the requirements of the syllabus. Thus a science master may set pupils who had acquired some knowledge of electricity to construct a home-made radio or telephone. From this the second meaning developed by reversing the order. Instead of confining projects to the applications of principles already taught, the project was organised in such a way as to precipitate a principle till then unknown. Thus boys may be led to a knowledge of electricity by being made to construct a telephone or a telegraph. This kind of project gives incidental learning and subordinates the real life character to pupil interest and purposes. The third meaning arises out of a straining of the sense of real life situation and leads to adult interests being imported into the school, the boy working at a project with the same interest and purpose as the adult will work on it in the real world. The most recent conception of the project stresses its purposive character and says, that when the pupil is whole-heartedly interested the real life character and application of knowledge will take care of themselves. This is the view of Dr. Kilpatrick and his followers Miss Wells and Dr. Collings They abolish the traditional subject organisation of the curriculum and organize the school experiences of the child round projects through which they believe that the facts, skills, habits, attitudes and ideals will be better acquired. Collings has four kinds of projects:—Story, Hand, Play and Excursion projects. Kilpatrick's four are, Producer's, Consumer's, Problem and Drill or Specific learning projects.

The Project method has the merit of selecting as school material, that which appeals to the purposes and interests of children rather than that which is useful for the adult to know. The supplementary project connects the school with life, while the real life project and that of the natural setting make learning to arise out of real situations and the Kilpatrick project starts right out of child interests. The project method assumes that learning is an active process and provides for freedom and group co- operation. While the real life project may be merely another way of introducing adult interests, the scheme of starting with child interests may lead to discontinuity in education. When, as in this school, pupil initiative is substituted for teacher initiative, education need not result in worth-while accomplishments. Hence parents and teachers should guide the educative process.

The project idea can be applied to most subjects in the curriculum. One notable way in which it might be applied is in the study of English. The Direct method, the Gouin Method, the study of realien by means of English room &c., are so many project ideas. Projects are easily thought out in geography. Thus the pupils could make the map of their district in sand and clay. The armistice day might give rise to a project in longitude and time. Transportation can be made the subject of a project. Pupils collect pictures, drawings &c bandies might be made, motors and railways might be represented by toys. In an actual class, five topics were chosen for essays, "importance of transport, from personal experience; relation to shelter, food, clothing and a history". So too the food supply and the sugar supply of the U. S. A. were learnt. In the same way, history topics might be studied e. g., why America declared war on Germany, the Virginia Plantation, Panama canal. In Mathematics we might study the widening of a street. But the best example is a multiform project like the building of a house. This cuts across the curriculum-mathematics, geography, history, domestic science, and economics being all required.

There are certain advantages in the Project Method (1). It entails no passive reception of information but enlists the activity of the pupils. The pupils learn by doing (2) It is of absorbing interest to the pupils. They think of nothing except their projects and are always talking about them (3) It makes them work for principles and thus acquire them in the process of evolving them (4) It follows the psychological order (5) There is the intimate connection between

knowledge and conduct (6) It makes the pupils to reason and it develops thought. (7) Thus it trains the person instead of stocking him with information. (8) There is very little of waste. The knowledge is acquired to satisfy a felt need (9) It has been proved by actual experience that pupils learn the schoolroom arts much more rapidly. (10) When the knowledge is learned in its actual setting it grows and flourishes in real life.

It has certain disadvantages also. 1. It disorganises the schoolwork taking every one out into the open. 2. The knowledge acquired comes to be scrappy. The logical organization of subject matter has its own advantages. The Project method will tie up principles in a number of projects. There will be a lack of systematisation. Thus the same project may involve addition, subtraction, multiplication, division, ratio etc. The logical order would take these up one after the other and the resulting knowledge would be systematic. 3, Correlation was designed to remedy the defect of extreme isolation, but in extreme correlation the demands of the subject might be neglected. The project idea puts everything again into a common pool. 4. To treat the project retrospectively as in history, is to strain the theory. Thus the Civil War was once a living project but now it can be dealt with only as a mummified project. 5. It would lead to the random in teaching. Formerly we selected the knowledge and then searched for its application to use ; now from use we search for knowledge 6. It would leave gaps in the pupils' knowledge for certain portions of the subject cannot come into the project at all 7. It would be impossible in the high school. Dr. Adams concludes that we could get most of its advantages without the disadvantages if we carry out one project every year. A very interesting application of the project method to Indian education has been made by Dr. Mckee at Moga in the Punjab. It is bound to revolutionise rural education in this country.

The basis of the Project Method is the philosophy of Experimentalism which is an out growth of the Pragmatism of William James, and the Instrumentalism of John Dewey. That philosophy denies the existence of such ultimate values of life as truth, beauty, goodness and holiness, and subordinates thinking to willing. Truth is but a means and not an end; and there is nothing true which is not subject to qualification. Goodness is only provisional. The moral law has no "antecedent existence" but is a matter of group opinion. Knowledge for knowledge's sake, art for arts' sake,

have no meaning. Culture and religion have hardly a place in life. Knowing is for doing and takes place in the heart of doing. Therefore learning is by doing and participation. Many of these ideas are due to the influence of biological studies, which have lent colour to the belief that the physical and the psychic are as earlier to later in the matter of development; and have arisen by applying conclusions arrived at by the study of animals to human life. Another contributory cause is, the industrial civilization of our times which is the child of experimental science. (See Childs: *Education and the Philosophy of Experimentalism*).

This philosophy has not been well received, though it is recognised to have given a new determination to education and life. Thinking does not arise merely in a problematic situation. Many uniformities in Geometry and some of the laws of Physics have been known by deduction. There is no scope for experiment or for controlling the conditions, in astronomy or human heredity. Saints learned not by doing, but by prayer and meditation. Man is not merely a means but an end in himself, and even Dewey has to admit the existence of such consummatory values, as those of leisure time activities. Truth is not what is convenient to believe. There was something objective tive in the fatness of the Prince Regent, though it proved inconvenient to Leigh Hunt to have believed it. If morality were a matter of group opinion, primitive societies which were the most socialised, should also have been the most moral. But the method is important as having emphasised the need for overcoming the lag between education and life. It is a good corrective to the extreme academic attitude of the old education, especially in the matter of infant educaton Incidental learning of the tool subjects, has been substituted for their formal teaching and child interests have been given their true place. But the project is not applicable to the earliest stages where absolute satisfactions alone count and not outcomes. It is equally inapplicable in the higher stages, where pupils should have developed interest in subjects for their own sake. In the intermediate stages of education, however, the project has proved fruitful.

Maxims of Methodical Procedure

Raymont : *Principles Chap 8.*
Welton : *Principles and Methods of Teaching pp. 62-66.*
Burnett : *Essentials pp. 118-120.*
Wren : *Indian Teachers' Guide Chap. 10.*

When once it had been settled what should be taught to the pupil the chief problem confronting the teacher is how to present it. This involves questions of arrangement and sequence and constitutes method properly so called. Method, in the sense in which it is used in education, means orderly pogression and signifies a starting point, a destination and a road between. So in regard to every course of study and of every lesson the teacher has to ask himself. "What is my aim?' 'What is my point of departure?' What is the path between?' Two broadly contrasted methods satisfying these requirements have been distinguished in the presentation of materials of any branch of instruction. In teaching a language, we may at the outset place in the pupil's hands a complete grammar, require him to take its contents on our authority and afterwards apply its forms and rules in speaking and in composition; or we may begin with easy sentences spoken or written in the foreign language, and lead him gradually to detect and to formulate the laws of its grammar. In the case of geography, we may adopt the order of a systematic text-book, beginning with the earth as a whole, giving definitions of axis, equator, meridians, continents, oceans, islands and the like, at length reaching the more detailed treatment of portions of the earth's surface; or we may begin with the immediate surroundings of the learner, and introduce gradually the more general aspects of the study. In learning to read and to write the child may begin with the letters, proceed to combine these into syllables, then syllables into words and at last words into sentences, or he may almost at once be introduced to easy words and sentences.

Now both these methods have their place in education. The teacher's function is to extend and systematise the child's knowledge; but it is even more his task to arouse interest, to stimulate the spirit of inquiry and to promote the self-activity of the pupils. The latter desiderata of a good education cannot be obtained by plans in which the child "temporarily receives everything from the (teacher's) authority". The method which combines these two aspects of instruction is the only method for teachers and may be called the pedagogic method

and some of its characteristics are well brought out by a few maxims of methodical procedure which pedagogy has accumulated. 'Proceed from the known to the unknown', 'Proceed from the concrete to the abstract', 'Proceed from the particular to the general', 'Proceed from the easy to the more difficult,' 'Proceed from the empirical to the rational, 'Proceed from the simple to the complex', 'Proceed from the indefinite to the definite' are some of them, by reviewing which we can arrive at some of the characteristics of the pedagogic method.

Some of these appear to be mere truisms and they are often considered to be the trite precepts of an obsolescent pedagogy. They may not all be applicable to one and the same lesson and some of them contradict one another. But when restated and amplified, they bring out some of the characteristics of the pedagogic method. For instance it is difficult to understand how any teacher can proceed except from the known to the unknown. What is meant however is that the teacher should use what is already known to the pupil, to lead him on in the steps towards knowledge. Teaching should not merely proceed to make clear and full what is known to the pupils but the whole course of instruction should be so arranged, as to provide for adequate apperception. This maxim has no application to teaching whose object is not the transmission of new knowledge. Again to say that we should proceed from the easy to the difficult appears to be the merest truism and yet as Bacon long ago pointed out, it is often advantageous to tackle a real difficulty first, with the expectation that the easier task will be of the nature of a recreation. Often it is very hard to say which is easy and which difficult. In performance, skill comes with practice and that which is difficult becomes easy when attacked and practised.

Herbert Spencer said that our lessons should start from the concrete and end in the abstract. It is true that a man is educated in proportion to the number and quality of abstract truths in his mental equipment. These abstract truths are arrived at by the pupil from the analysis and sifting of concrete instances. So far the maxim is true. But many teachers think that we should continue to be in the concrete; and believe that once we reach the abstract, we need not come down to the concrete. As a matter of fact we should try to use more and more of abstraction, as the child grows up and we must apply the abstract law to concrete instances to make it clear. The maxim "proceed from the particular

to the general'' means very much the same. The next maxim that we should "proceed from the empirical to the rational", has similarly to be carefully interpreted. Empirical knowledge rests only on the observed facts of experience, but of which we can give no reasoned account. A boy may know empirically that a spectator at a cricket match sees the ball struck before he hears the sound of the impact, or that exposed water pipes burst after a hard frost. Rational knowledge, on the other hand, is that in which such facts fall into their places, in a more general system of truth, and are thereby scientifically explained Hence the boys' empirical observations should be marshalled and analysed and should be made to lead to rational truth. This cannot be applicable to every lesson as it may not be possible to reach the rational within the limits of a single lesson. Moreover especially in lessons inculcating moral truth we lay down the law at a very early stage and proceed to illustrate it with instances. Thus in teaching the precept "Love thy neighbour as thyself" we do not wait till the child has built a concept of altruism by means of his experience.

The maxim that we should proceed from the simple to the complex is equally ambiguous. Which is simple and which is complex? Is the notion of a line, a point, a circle in Euclid simplest or the concrete instance in which each of them occurs? If the former, then Euclid is right and this maxim will be a flat contradiction of the other which tells us that we should proceed from the concrete to the abstract. But even here the maxim may be applied if we construe the concrete as the simplest which on analysis discloses complexity. The maxim "proceed from the indefinite to the definite'' can be only held to mean that at the end of instruction the child's ideas of the subject in question should be more definite and clear. Thus a boy's initial knowledge of a flower is vague and indefinite ; but after a botanical lesson it is more definite. We have now seen that these maxims help if their true meaning is grasped. They are secondary principles on which the wise teacher will plan a lesson and they serve as guideposts for successful teaching. Everything considered, they form a code of doctrine which is entitled to a certain amount of respect.

School Hygiene.*

Education is concerned not merely with the mind of the pupil but also with his body. This imposes on the school duties both positive and negative. On the negative side it must be seen to, that school work does not contravene the laws of health. It should be done under hygienic conditions. The site of the school, the lighting and ventilation, the school furniture and equipment, the curriculum and the time-table should all be arranged so as not to interfere with the health of the scholars but to promote it. School work goes against the natural bent of the child's life and everything should be done to render it innocuous. Positively, it is the duty of the school to instil into children's minds a knowledge of the laws of health. At present they get up a large amount of information which is absolutely useless in later life and which they forget soon after leaving school. But they have no notion as to what they should eat and what they should avoid eating, no notion of personal hygiene or of the care of the body. Our chief motive should be, to produce in the children the desire to lead a clean and wholesome life and to possess vigorous, healthy bodies. The effect of this would be cumulative. The youth of today are the parents of tomorrow; so that if the present generation knows the rules of health, the next too will be brought up under healthy conditions. Hence hygiene has an important place in the school.

The teacher should be familiar with the principles of School Hygiene because it is he who has ultimately to enforce the laws of health. Very often contagious and infectious diseases spread rapidly in the school. If the teacher had only detected in time the boy who had spread the contagion and segregated him, the epidemic would have been averted. This is very necessary in a school where the natural weakness of children make them very liable to infection. Besides the teacher should know to detect the common ailments by their symptoms. He must see that

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**Every teacher should read some one of the standard text-books on school Hygiene such as those by Shaw, Lyster or Porter. The 'Teachers Encyclopedia' Vol. IV may be read with advantage. In addition books on special topics like "Fatigue" "Eyesight" "Handwriting" may be consulted.*

pupils assume the correct postures. He must find out the illfed children and the defectives from whom it would be cruelty to expect much. He must be able to find out fatigue by its symptoms and to know when any organ like the eye is being strained. Therefore the teacher should be properly grounded in the laws of health.

The Site of the School

The site chosen for a school should be healthy. Four conditions should be attended to in the selection viz., the nature of the soil and subsoil, the drainage, the aspect and elevation, and the surroundings. *Soil*: Two divisions have to be noticed in all soil—the soil and subsoil. The upper layer is composed of inorganic and organic matter, the latter of animal and vegetable origin. The subsoil is purly inorganic and contains no bacteria. Some soils are porous, while others are impervious. While the former allow a free passage to water, the latter do not. *Ground water*: Generally there is a layer of porous soil on the top and below there is an impervious layer. Rain falling passes through the porous part and gets collected above the impervious layer. This is known as ground water. It is an under ground river flowing to the nearest stream or the sea. The level of this ground water is the depth of shallow wells in the neighbourhood and varies with varying rainfall and by the making of fresh channels or, the deepening of neighbouring watercourses. For a healthy site the level of the ground water must be ten feet below the surface.

Ground air: The porous upper layer of the soil contains varying amounts of air which in certain cases reach to 50 per cent. The composition of this air differs from that of ordinary air in four respects (1) It contains a much larger percentage of carbon-di-oxide produced by the oxygen in the air combining with the carbon of putrefying animal and vegetable matter in the soil (2) Hence it contains less oxygen than ordinary air (3) It contains a great quautity of organic and other gases such as marsh gas (4) May contain large numbers of bacteria. Ground air is always moving for one reason or another. A rise in the level of ground water would force out the ground air. When the soil is warmer than the air as in autumn and winter, the ground air will expand and some of it would escape into the atmosphere. This also happens with changes in barometric pressure. It is an undoubted fact that if large quantities of this air gain access to a house or a school it is liable to produce serious injury to health.

Soil has influence on the healthiness of a site. The damp is unsuitable to health. Dryness depends upon the depth of the ground water and the easiness with which rain water runs off. Deep gravel is good and so are rock and chalk and limestone while clay is bad as a site. Damp brings on lung diseases, rheumatism, catarrh, neuralgia, throat affections, and favours the spread of measles and whooping cough. Where the ground water is not below 10 feet, damp is bound to be present. Made soils are not generally good for building. Very often when the original soil has been dug out for some purpose or other, the cavity is filled with all kinds of rubbish. This contains organic matter and the air emanating from it makes the atmosphere in and out impure. If at all such soils should be built upon, it can be only five years after the filling in. Tetanus, Oedema and anthrax bacilli have been often discovered in soils. Malaria is mainly a result of damp soils and disappears with good drainage.

Such an aspect should be chosen as would secure exposure to the sun and to the east and north winds. All rooms, as far as possible, should be exposed to direct sunlight some time during the day, as it forms one of nature's best disinfectants. A southerly or southwesterly aspect secures abundance of light. Hollows should be avoided. The surroundings of the school yard should be artistic and agreeable. No brick-yards or offensive works should be near by. Trees may give shade but they should not be too close to impede the free circulation of air. High walls and lofty buildings in the neighbourhood should be avoided. The building should stand as far away as possible to avoid noise and dust. The grounds should be extensive enough to provide ample play-grounds, 2 acres for a one-room school, 3 acres for a two-room school, 4 acres for a three or 4 room school, in Secondary schools 2 acres per 100 children. A space of 25 square feet of playground for each child should be the minimum. Part of this area should be under cover for play in wet weather. The site should be quarter of an acre for every 200 pupils, or 54 sq. ft. per child.

Construction of the Building.

The surface soil should be removed and the whole site should be covered with a layer of concrete, the object being to prevent moisture rising up into the room. Walls too should be damp-proof. The floor is better made of wood as it is noiseless, durable and clean. The internal wall-surfaces might be left uncovered, in which case the bricks should be

hard and impervious. If plaster is used only such kinds should be selected as would be non-absorbent and could be cleaned readily. Ordinary plaster absorbs moisture and organic matters, as it is found from the walls of hospitals. White-washing and colour-washing do not remove this defect, and so some disinfectent should be added to the wash. Everything that would interfere with a clean sweep should be done away with. Hence walls and pillars should not have sharp corners where dust and dirt could accumulate. In selecting a colour for the walls we should prefer one which would not tax the eye or absorb light to any extent. Red absorbs light and yellow produces fatigue and nervousness. A light greenish grey is the best. Those parts within reach of grimy fingers should be dark.

There should be enough entrances to the school to permit of its being emptied completely in less than three minutes. This is to prevent crowding round doors during an accident such as a fire. There should be in no school less than two entrances. External doors should open outwards. Stair cases should not be less than four feet nor more than six feet wide, and there should not be more than fourteen steps to a flight. The former requisite is to prevent crowding, the latter to avoid fatigue. Stair cases should have a solid wall on both sides of the flight and should be constructed of fire-resisting material. As children fall over banisters, there should be no balustrade, but there should be walls on both sides and there should be a handrail. Each flight should have a square landing to rest the muscles and prevent accidents. The width of each step should by no means, be less than 11 inches and the height should be at least six inches.

The Classroom. The best shape for the classroom is that of a rectangle with the greater side about a fifth longer than the smaller sides. The pupils should sit facing one of the shorter sides. There should be at least 15 sq. feet of floor space and 200 c. feet of air space provided for each scholar. The length of the room is limited to 30 feet i. e., by the distance to which the teacher's voice would carry and the distance at which scholars with normal eyes, could see writing on the blackboard. Thus we arrive at the dimensions 30 feet by 25 feet. The floor space here would be 750 sq. feet and if we have a height of 13 ft. the room would contain 9750 c. ft. of air. This will accommodate 48 scholars giving them the requisite floor space and air space. But this is too large a class for any one single teacher. Ordinarily 40 is considered to be the maximum number for boys in a class.

Lighting. The continued increase of shortsight among children focuses attention on school lighting. The most perfect ease in reading or writing is obtained in the open air on a dull day. The light is well-diffused, appears to come from nowhere and casts no shadow. Light should never fall directly on the eyes but should illuminate the book or other object we are looking at. In order to have enough light, the window space must be not less than a fifth of the area of the floor of the classroom. Windows should be as high as possible and it is better if there is no space between window and ceiling. The windows should begin 4 feet above the floor to prevent reflections on the desk tops. Light should be admitted from the left side of the scholars. A right light is next best though the pupil's writing is in this case made under the shadow of his pen. It should on no account come from the front in which case it dazzles the eye, or from behind, in which case it throws a shadow over the scholar's work and shines full on the teacher's face. Light should be diffused equally all over the room, leaving no dark corners. It should be abundant. A dim light depresses the mind and retards mental growth. Light goes with knowledge and develops mental power. Regard should also be had for provision during dull days. The light shed by a candle a metre away from a person is called a candle metre. Within the classroom there should be at least fifty candle metres of light at every spot.

Ventilation is a matter which has great influence upon health at school. Floor space is important and so is cubic space: but however ample these may be they only delay the time when the air would be effectually poisoned, if there is not at the same time adequate arrangements for ventilation. One room much smaller may yet be healthy because there is good ventilation. Another room much bigger might yet suffer from over-crowding because the ventilating system is at fault. Inspired air contains the following percentage composition;—Nitrogen 79 per cent, Oxygen, 20.06 per cent. Carbondioxide ·04 per cent. There are also quantities of water vapour, organic matters, ozone, oxides of nitrogen and sulphur and sulphuretted hydrogen. Expired air, on the other hand, contains the following percentage composition:—Nitrogen 79 per cent. Oxygen 16 per cent. Carbon dioxide 4·4 per cent. It is also full of water vapour, is warmer and has some organic impurities. School air thus differs from fresh air in many particulars. 1. There is more than ·04 per cent of Carbin Dioxide. 2. Organic matter from the

to an ill-ventilated room. 3. There is a decrease in the amount of Oxygen which lowers the vitality. 4. There is an increased amount of water-vapour which prevents evaporation of moisture from the surface of the body. 5. The temperature rises causing discomfort. 6. Organic matter which begins to decompose on the clothing. 7. In addition it has dust consisting of scales of skin, fragments of wool, cotton and bacteria.

The carbon dioxide is the main impurity. It has been estimated that ·02 per cent of CO_2 could be added to fresh air without making it unhealthy. Therefore ·06 per cent is the maximum permissible quantity of carbon-di-oxide in the air. Now the average adult produces ·6 c. ft of carbon-di-oxide by respiration per hour and in the case of children this may be taken to be ·4 c. ft.

Now ·02 c. ft of CO_2	could	be	added	to	100	c.	ft of air.
Therefore ·04	"	"	"	"	200	"	"
" ·4	"	"	"	"	2000	"	"

Hence 2000 c. ft of air is hourly vitiated by the CO_2 given out in respiration. It follows then, that if we allow 200 c. ft for each scholar the air in the room should be changed ten times. Ordinarily by the principle of diffusion the air in any room will be renewed once every hour and hence the remaining nine times should be brought about by means of ventilation.

If such ventilation does not take place there is the danger of ill-health. Living in a badly ventilated room for a few hours produces drowsiness and headache, a sense of oppression and discomfort, slowing of the heart's action and quickening of respiration. Hence it interferes very much with the efficiency of both teachers and scholars. The pupils could not concentrate their attention. The lowering of their vitality makes them peculiarly liable to such diseases as consumption and anaemia, and infectious diseases once started spread rapidly,

Methods of ventilation could be divided into two classes natural and artificial. Natural ventilation depends upon the natural forces which set air in motion. Artificial ventilation is brought about by the use of pumps, fans etc. Two properties of gases play an important part in ventilation : one is diffusion the other the change in the density produced by heat. Diffusion is the property of gases to mix thoroughly even in spite of gravity i. e., a heavy gas would diffuse upwards and

completely mix with a lighter gas and a light gas would diffuse downwards and mix with a heavier one. They have a greater tendency to diffuse when gravity is with them. The air in a room is ordinarily warmer than the outside air and hence lighter. Therefore diffusion outwards takes place at a greater rate than diffusion inwards. When air is heated it expands and so becomes lighter. Hot air therefore rises and cold air rushes in to takes its place. This is how winds are produced and this is how ventilation is helped. Foul air being a product of respiration is warmer than ordinary air. So it will rise and escape if any opening is provided. *Wind* is a ventilating agent and does its work (1) by perflation or blowing through a room when the doors and windows are open (2) by aspiration. For example the wind blowing over the top of a chimney lessens the pressure of air in the chimney and produces an up-draught. To fill this space air from outside rushes in.

When arranging openings for ventilation both outlets for foul air and inlets for fresh air should be provided. For supplying the 2000 c. ft. per hour that is necessary, there should be an opening of 16 sq. in, assuming that air travels at the rate of 5ft. per second. So in a class of 48 scholars inlets should have a total area of 5 1/3 sq. ft. and outlets the same or rather more. Outlets should be near the ceiling and inlets five feet above the floor to be free from dust. The inlets should direct the current of air upwards. The simplest and most obvious method of ventilation is that of open windows; and in warm weather it is undoubtedly the best. In cold weather, however, it is liable to produce draughts. All windows should be made to open both at the top and bottom; and in any interval which occurs in the work of the class, they should be opened. A very slight opening at the top and at the bottom of a window is often found to be effectual as a ventilator; for you have here what the engineers call an upward and a downward shaft, the colder air coming in at the bottom and passing upwards so as to expel the bad air at the upper opening. If there is any reason to suppose that the air is likely to become bad in a three hours' sitting of the school, it is a good plan to break up the class for ten minutes when half the morning or afternoon's session is over, and in this short interval to throw open all the windows and introduce a fresh supply of pure air.

Children require a frequent drink of water, and their health suffers if such is not available. In play grounds a drinking fountain is best. Cups very often spread disease. If the water comes from shallow wells or springs there should be no suspicion of pollution by drains or cesspools. Water is contaminated in a number of ways. It may be polluted at the source as from a marsh or a sewage: it may be polluted in transit as when it passes over sewage etc: it may be polluted in storage from dirty cisterns and during distribution, Lavatories should be ample. One lavatory basin to twenty scholars should be regarded as a minimum, one to ten is desirable. There should also be adequate closet accommodation.

School Fittings.

The desk. The problem of the kind of desk to be used in the class room is very important. Even the best kind of desk would prove injurious if pupils are seated on them for long periods together. The maximum time for which a pupil may be kept seated at a stretch is one hour. Half and three quarter of an hour's sitting, at a time would prove beneficial. Even these should be alternated with periods when children stand as in play and drill. Desks should be fitted to pupils same as clothes. Very often they are constructed to suit ages forgetting the fact that children of the same age differ considerably in their heights. The best kind of desk would allow for the following four conditions being observed in seating. 1. The two ischial tuberosities should rest equally on the seat. 2. The body should be erect and the back supported. 3. The head should be in such a position that the line joining the centre of gravity of the head and the body bisects the line between the two ischial tuberosities. 4. The thighs should be horizontal, the legs vertical, and the feet should rest flat on the floor. In this position the body is balanced without much loss of energy.

Reading is best done if the matter is at an angle of 45 degrees to the horizon in which case the top and the bottom of the page are equidistant from the eye. For writing 45 degrees would have serious defects. The ink would not flow and the arms and hands would havo to be kept in tiring positions and therefore an angle of 15 degrees would be more suitable. Hence if the same desk should provide such different inclinations, it should be adjustable. Two technical terms are used in connection with desk measurements. The "difference" is the vertical distance from the edge of the desk to the level of the seat. This should be

such as would bring the edge of the desk opposite the navel of the pupil. Then he would be able to place his arms on the desk by moving the elbows slightly away from the side. The 'distance' is the measurement from the edge of the seat to the vertical line dropped from the edge of the desk. This classifies desks into there kinds. 1 The' plus' desk where there is distance. 2. The 'zero' desk were there is no distance. 3. The 'minus' desk were the distance is a negative quantity. For writing the best desk is the 'minus' variety. The 'plus' desk is unsuitable for 1. The body is thrown forward and so the lungs heart and abdomen are cramped 2. The vertical line from the centre of gravity of the body does not bisect the line joining the two ischial tuberosities but falls in front of it. 3. The abdominal wall is folded which interferes with the proper working of the organs inside 4. Fatigue is brought on as the holding of the head and neck in this position consumes a great deal of energy. 5. The bending forward brings the reading matter nearer than 12 inches. But the "plus" desk allows room for the boys to stand up and to move about and it is also good for reading when it is "zero,". To get all these advantages, desks should be adjustable either for plus zero or minus distance. Misfit with regard to desk adjustment brings on eye and spinal trouble and even consumption. Where scholars have to adjust themselves to fixed seats and benches as when one set of students have to sit in a room designed for another, the best method of avoiding the ill effects of maladjustment is to make pupils be seated for short periods. Lessons could often be given with pupils standing. Otherwise the desks should be adjustable. The front edges should be rounded off to prevent pressure upon the blood vassels and nerves of the thigh. The width of the seat should be at least ⅔ of the length of the child's thigh. Each should have a proper back with a concave surface forward and should go high enough to support the lower part of the shoulder blades. Footrests are unnecessary and undesirable, as they prevent the free movement of the legs and prevent the floor being cleaned properly. Single desks are the most hygienic as they prevent contagion spreading, but they are expensive. Dual desks may therefore be preferred. The desks should be arranged near the lightest part of the room. They should be so arranged that the pupils face the long way and the view of any apparatus or diagram may not be foreshortened. Infants under six years should not be provided with desks, and for young children it is necessary to provide desk accommodation for only half the class while the rest might be working on blackboards.

Blackboards. Slate blackboards are to be preferred as they could be washed without injury. They should be either black or green in colour. The inhalation of chalk dust leads to consumption and hence only a damp duster should be used. There cannot be too much blackboard in any classroom. One of the ways of affording relief from cramp and fatigue is to send scholars in batches to the blackboard to write various exercises. The blackboard should be 4 ft. wide and the height from the floor should vary from 26 to 35 inches according to the height of the scholars. An excellent arrangement will be to provide a grooved trough at the bottom so that the chalk dust might be gathered there and removed later. Teacher's platform are good especially for those who are short of stature. They are, however, unsanitary because dirt and dust collect all round and beneath them. They also seriously interfere with the free movements of the pupils about the room and at the blackboards.

School cleaning. 1. Desks and seats accumulate grease and dirt and become dangerous to health unless cleaned periodically during the vacation. 2. Dirty windows decrease the amount of light. To keep them dirty is to present a bad model to pupils and renders any instruction in hygiene unvailing. 3. Walls should be cleaned, no dust being allowed to lodge in them. They should be more frequently cleaned so high as the scholars can reach 4. Every day the *floor* should be cleaned. Water should first be sprinkled and all the windows should be kept open during the operation. If neither of these is done the dust rises up and settles down once again on the desks, floors and shelves. Dust is a potent cause of ill-health and should be avoided.

The Hygiene of Growth

The child is a growing organism and the teacher should be able to note if this growth is proceeding in a normal fashion. The child resembles the adult in general structure but there are many differences of detail. For example in the child, the head is one-fourth the size of the whole body while in the adult it is only an eighth. During growth the height of the head doubles, the length of the trunk is multiplied by three, of the arms by four, and of the legs by five. Nutrition is an essential factor in growth. There are several ways of finding out malnutrition. The well nourished child has a great amount of sub-cutaneous fat which gives it a chubby appearance. Where this chubbiness is absent the child is illfed. The complexion is another clue to the state of

nutrition. In fair children a rosy hue goes with a rich blood supply while in swarthy children, the colour of the lips and gums, forms a good index. The state of the hair again, forms a good sign of well being. Where it is abundant glossy and luxuriant, there is good nutrition ; where it is scanty and dry the child is apt to be ill-nourished. The skin of the ill-nourished child is dry and parched, pimples are abundant, and cuts and scratches heal but slowly. The badly fed child also lacks vigour and energy. The causes of malnutrition are the poverty and neglect of parents, improper feeding, juvenile labour, town life and a nervous temperament which swallows up a great deal of energy.

There are seven ways of investigating the physical condition of pupils and they form school anthropometry. I. Measurement of weight. A steelyard may be used. Pupils should be frequently weighed and their weight compared with their past weight and with standard weights for the age. 2. Measurement of height. The weighing machine generally has the measuring rod attached. 3. Sitting height and measurement of head should also be taken. 4. Chest measurement both after inspiration and expiration. 5. Vital capacity is the quantity of air which can be expelled from the chest after taking as deep a breath as possible. 6. The strength of the handgrasp can be measured by the dynamometer which contains a ball which on being firmly grasped indicates the amount of pressure exerted on a piece of graded cardboard. 7. Sensibility to touch can be measured by the aesthesiometer. This is a compass and if the child is weak the distance at which the two points can be told apart becomes greater and greater.

Many disorders are connected with malnutrition. Rickets is the most common and produces deformities such as bowlegs, pigeon breast and spinal malformations. Rickety children are easily fatigued and so they should be frequently rested. They should not be exercised in strenuous work. The cure is fresh air, sunshine and abundance of suitable food. Debility and anaemia are other disorders connected with malnutrition. The child suffering from debility has a tired look, has hollow eyes with dark rims underneath, and is easily fatigued. Such children should be removed from school for a time and placed under special treatment. Anæmia is easily discovered by the paleness of skin, lips and gums, and the shortness of breath. Anæmic children should be placed under medical treatment. The best treatment for all these defects is a good dietary. Nutritious food, properly cooked and supplied in reasonable abundance produces worthy bodies.

The child study movement has divided the growth of the child into several stages (See Raymont Chap. V) For our purpose we shall adopt the periods chosen by Bagley in his *Educative process* Chap. 12. apparently based on the researches of Stanley Hall and the Child Study Movement. (Thayer; *The Passing of the Recitation chap V*). The school life of the child has been divided into three stages (1) the *Transition* stage from six to eight (2) *Formative* stage from eight to twelve (3) the *Adolescent* stage from twelve to eighteen. These stages tally roughly with the Primary, Middle, and High School stage of our educational system. At no one of these stages is the, child markedly different from any of the other stages because the one gradully merges into the other, but between the early childhood and the late adolescent stage, the child has undergone a revolution and each crest of the developmental waves has been termed a metamorphosis.

The Transition stage marks *physically* a period of rapid growth. A large part of the energy is used up in building the tissues. Naturally therefore the child is easily fatigued and is susceptible to disease. A coordination of the smaller muscles and finer nerve connections takes place and the whole is a period of nervous disintegration. *Mentally* the period marks a passing over from passive attention to active attention from direct interest to derived interest, from means to ends. But in the matter of thought and judgement he has not reached the stage of the rational animal, His thinking is of the concrete type, his judgements are of the practical order and since he has not proceeded far on the way towards abstraction, he is not capable of logical reasoning. *Morally* since the child is not yet capable of inhibiting momentary impulses with reference to remote ends, which is the essence of the moral act, we should look upon him as unmoral rather than immoral. Since he cannot inhibit brute impulses by reference to a remote ideal; we should control them by the pleasure-pain principle.

The *Formative* Stage is marked by slower physical growth and so energy is set free for other activities. This is at the root of the child's incessant activity. He is not very susceptible to disease or fatigue. His brain is almost already fully formed. Hereafter development is only in internal organisation and consists in the formation of recognised pathways of neural discharge. Hence this is the time of habit formation. Instrumental practice in music, pronunciation, habits of cleanliness and neatness in dress, and forms

of etiquette should be practised in the period. *Mentally* the habit of active attention is not yet confirmed and distractions have their effect. The "runaway" curve reaches a very high point in this stage and the necessity to stay with a task becomes irksome. Verbal memory is at its best and logical reasoning is nascent. *Morally* the child has not yet reached a stage when the *rationale* of moral truths can be understood; but the period is one in which specific habits like cleanliness, industry, honesty and obedience may be created and exercised by arbitrary authority.

The Adolescent stage has been better studied. It is a period of rapid growth and so there is a lack of energy for other purposes and the seeds of adult dlseases are often sown in this period. There is also a nervous disintegration resulting in awakward movements and clumsy gait. But the main physical change is the development of the sexual functions. *Mentally* this is the period when the social instincts such as fear, anger, jealousy, ambition, pity, sympathy awaken and the life of the child ceases to be selfcentred and anti-social. Seeing so many instincts awaken in this period impulse is strong and the adolescent chafes at authority and better results can be achieved by appealing to interest. These interests are "acquired interests" and so are of a higher order. Many of the instincts begin to function efficiently, curiosity develops into a love of knowledge for its own sake, imitation becomes purposive, emulation forms the basis of ambition, the love of the problem develops an interest in causes and effects. Reasoning comes to take a larger place and the child becomes capable of abstractions. The broad conceptions of science, the wide movements of history and the critical study of literature are suitable. *Morally* the period is the breeding ground of ideals. Extreme religiousness or extreme wickedness have their foundations here. Conduct is ordered in consonance with a distant future. Reason rather than authority should be appealed to in moral training.

The period of adolescence introduces many problems into our educational system. Firstly all children do not attain to puberty at the same age. Girls attain puberty sooner than boys, children of certain races reach puberty sooner than children of other races and there are individual differences so that a span of four years may be legitimately allowed for the pubertal age. A class grouped according to the physiological age of 12 to 16 may contain children at different stages of sexual maturity and common

measures and methods could not be adopted. Differences in intelligence and deficiency of intelligence, exhibit themselves in an exaggerated manner in this period. Hence the defects of a uniform course become marked, and the task of devising suitable courses for each group, becomes difficult. Secondly, the development of the sexual organs and the beginnings of the sex functions render some kind of sex instruction necessary. This could best be achieved by giving an objective treatment of the reproductive process in connection with nature study at a time when pupils could study it without undue self-consciousness. Thirdly, during this period the migratory instinct is at its peak and shows itself in truancy. Some kind of outlet should be provided for it in excursions, nature study rambles and the school journey. Fourthly, the gregarious instinct begins to develop. Team games become attractive and within the class co-operation and interclass competition may be made to take the place of individual competition. Fifthly, the altruistic instinct dawns in this period which may be utilised, for implanting ideals of service. Children begin to take heed of other people's opinion of them. So discipline may be maintained through the public opinion rather than through the teacher's authority and some kind of pupil self-government may be established. The teacher should substitute the fraternal for the paternal attitude. Sixthly, adolescence is the seed bed of ideals. People in the immediate environment or from the pages of history and literature, are selected as models to be imitated. This period, may therefore be used for diverting pupils into life vocations and avocations by teaching the life and careers of men distinguished in different walks of life. Seventhly, as the reasoning develops, authoritarian instruction palls and rational instruction should take its place. A little child may be satisfied if you give a mechanical rule for the extraction of square root ; but the adolescent demands an explanation of the rule.

The Alimentary System.

The human body is made up of a bony frame work clothed by muscles and served by a number of functional systems such as the Alimentary system, the Circulatory system, the Respiratory system, the Excretory system, and the Nervous system. We shall have to consider the hygiene of each one of these systems. The Alimentary or Digestive system contains the organs of digestion which process begins in the mouth itself. The teeth play a great part in digestion

and their proper care is said to be very conducive to health and so should be taught in school. It is also associated with the national physique. At a very early age in a large number of cases the whole of the working teeth are gone or are useless. The result is that the food cannot be chewed properly and the digestion is upset and the health, suffers. Decayed teeth are responsible for toothache and consequently of a great deal of irregular attendance at schools. There are two sets of teeth one following the other. The first dentition begins to take place at about six months and the whole set goes by the name of the milk teeth. The milk teeth are succeeded by a second set of permanent teeth. These are thirtytwo in number and consist on each side of each jaw of two incisors, one canine, two bicuspids and three molars. There are no molars in the milk set but they appear before the milk set is beginning to be lost. All sound teeth are completely covered, in all the part that shows above the gum, by a layer of what we call enamel. This enamel has no nerves in it and therefore cannot feel. The part of the tooth underneath the enamel is called the *dentine*. It is much softer than the enamel, so that things can pierce some distance into it, and it is filled with tiny branches of the nerve that goes to each tooth.

The great complaint to which teeth are liable is decay or *caries*. The predisposing causes of dental caries are heredity, malnutrition and acute illness. The Jews as a race have very good teeth. Often when the baby is not nursed at the breast some substitute food is used which does not suit the teeth. After acute illness we find a ring round the teeth, just as we find them in the nails of the hands. The determining cause is the presence of bacteria and the formation of an acid medium, the two being interrelated, the one acting only in the presence of the other. The saliva in the mouth is alkaline, but if the mouth has not been properly cleaned the fermentation of decaying food left between the teeth, promotes the growth of microbes which form acids, especially *lactic* acid which is able slowly to dissolve the chalk in the enamel of the teeth. When the enamel is melted away the dentine is exposed and the nerve ends which it contains are likely to be excited by sweet things for example and we get toothache. Prevention is possible if we clean the teeth morning and evening. An antiseptic should be used on a soft brush, which while capable of entering the interspaces would not at the same time make the teeth bleed. A tooth powder is better than a tooth paste because by rubbing, it keeps the teeth free of tartar. Another method

of prevention is by giving proper work for the teeth to do, from a very early age. Every organ gets strengthened by use and teeth form no exception. The teeth of animals and savages are very good because they are exercised on hard and fibrous food. It is our civilised, soft foods that bring on caries. Hence children should be habituated to the mastication of certain hard foods like crusts and biscuits. Drinking between mouthfuls is bad and water should be taken only in the end. Sweets should never be taken between meals, nor at the end of a meal. There should be a cleansing food at the end of every meal such as fruit, vegetable, toast.

A few of the minor diseases of the digestive tract may engage the attention of teachers. *Indigestion* is responsible for a great deal of absence from school. The symptoms are nausea and vomiting and the child is often feverish. The causes are dental caries unsuitable or badly cooked food, bad arrangement of meal times, consumption of sweetmeats or other dainties and insufficient outdoor exercise. Such children should be sent home and put to bed. *Constipation* is common among children and is due to the nature of the food and the lack of a regular habit. Children would often check the desire to relieve themselves to go on playing with their toys &c. The remedy is the establishment of a regular habit. Food stuffs which have a mild laxative effect should be added to the diet. Exercise should be provided. A few children suffer from a want of control of the bowel. These are constitutionally nervous or are suffering from diarrhoea or indigestion. Here again the establishment of a regular habit is desirable. Many children suffer from *intestinal worms* which give rise to wasting, colicky pains and nervousness Such children are restless at night, grind their teeth and suffer from night terrors. A doctor should be consulted in such cases.

The Circulatory System

The chief organ of circulation is the heart and we should see that the school-work does not affect the heart prejudicially- The three chief enemies of the circulatory system are age, strain and disease. In childhood the elasticity of the muscles of the heart and the arteries are at their highest, and children are not able to exert themselves much nor can they bring all their muscles into play, and hence heart-strain is not very likely to occur. When young children are sitting still, respiration is slow, the-heart beat is diminished and the blood stream stagnates, with the result that the child fidgets

about and has, a feeling of discomfort. The remedy is to break up the class and to allow the children to make a few active movements. *Heart-strain* in schools is closely associated with athletics, and is caused by the use of heavy dumb-bells, excessive exertion in running or sudden severe pain as in tackling in football Children who had recently recovered from diseases such as influenza are specially liable to heart-strain. What happens is that the heart is somewhat dilated and so loses its elasticity. The children afflicted suffer from breathlessness which in extreme cases may become palpitation, and show a certain lassitude and disinclination for exertion. Great care should be taken how we choose pupils for athletics and particularly for competitive running races. The one mile races and 'Marathon Races' should not be open to children, The quarter mile requires great exertion and only some pupils are fit for it. No one has got the same qualities required for the mile for example and the quarter mile. Boys should be medically examined as to their fitness for a race. *Heart disease* is connected with the valves of the heart which are congenitally defective or have become diseased through rheumatism etc. The child has a blueness in the nose and cheeks and is cold in the extremities. Children suffering from heart disease should not be allowed to exert themselves even in such small matters as stair climbing.

The Respiratory System.

The organs chiefly concerned are the respiratory passages, the lungs and the chest. The respiratory passages consist of the nose, the nasopharynx, the larynx the trachæa or wind pipe and the bronchiæ. Normally children should breathe through the nose; but many children in school would be found to be breathing through the mouth. In many this is only a bad habit, but in others it is due to some obstruction in the nose. This obstruction may be due to a cold in the head, chronic thickening of the mucuous membrane as a result of frequent colds, foreign bodies in the nose, of adenoids. *Foreign bodies* such as a coin or a button may have been inserted by a boy in his nose and carelessly left behind. If it is not removed it leads to irritation and discharge of matter. *Polypi* are fleshy growth in the nostrils which have to be surgically treated and have a tendency to repeat themselves even then. *Adenoids* are more frequent. They are due to tumours in the naso-pharynx caused by the overgrowth, of mucous membrane. Children having adenoids breathe through the mouth, look dull and stupid and the bridge of the nose is somewhat broad. When adenoids

block up the eustachian tube the children become deaf and consequently make very little progress in the school-work. Prevention of adenoids may be effected by protection against colds and by deep-breathing exercises which would keep the passages clean. In severe cases the only cure is surgical operation. Diseases of the lungs are sufficiently serious for the parents to be careful of them; but we can do something in the school to promote healthy lungs by securing a robust chest. 'Pigeon breast' is caused by rickets, by faulty posture, and by insufficient exercise of the lungs. By careful attention to postures, and by means of deep-breathing exercises, the teacher can do a great deal to promote lung capacity.

The Excretory System.

Under this we have to consider only one organ—the skin. The skin is divided into two layers, the outer and inner or the epidermis and the dermis. The outer skin is made of very much the same material as our nails or the hoofs of a horse or various kinds of horns. The dermis is alive with nerves and blood vessels. The epidermis is made by the dermis and since it is not alive we can pierce it by a pin and not get any pain at all. The dermis contains nerves, blood vessels, sweat glands, hair roots and sebaceous glands which secrete a kind of oil for the hair. The functions of the skin are four in number. (1) It serves as a protective layer over the surface of the body (2) It is one of the excretory organs of the body. The sweat glands secrete about a pint of water every twenty-four hours which is got out through the sweat ducts. The sweat contains a certain amount of impurities. (3) The skin is a sense organ concerned with the senses of touch, heat and cold (4) It regulates the heat of the body, keeping us cool on a warm day and warm on a cold day. On a hot day the blood vessels on the skin are flushed and the sweat glands secrete a great deal of sweat. This sweat evaporates from the skin taking a great deal of heat in the process, thus leaving the body cool. On a cold day there is not so much of perspiration and so the heat is retained in the body.

The surface of the skin is constantly receiving sweat from the sweat glands and greasy matter from the sebaceous glands. These keep the skin moist and greasy, allowing the dead scales of the epidermis, which is constantly shedding its epithelial cells, to remain in it and causing dirt dust and particles of clothing to stick to it. This cakes into a hard crust leading to many injurious results. (1) It stops up the sweat glands and prevents them carrying out their excretory

function. (2) Similarly the sebaceous secretion is also stopped up. (3) This cake interferes with the sensory function of the skin by making it less sensitive (4) The dirt is an apt soil for the growth of germs which might cause all kinds of skin diseases. (5) It creates a dirty stench. (6) It produces vermin. So it has to be washed off. Water alone will not do it. Soap combined with it, makes it soluble and thus cleans it away.

The teacher has great responsibilities with regard to the pupil's personal cleanliness. He should see that the pupil's clothing is neat, clean and hygienic. In the matter of habits of cleanliness and neatness the teacher should be a model to his pupils. His hair, nails and linen should be neat and beyond reproach. He should also keep his room and its furniture as a model. Definite, direct instruction should be given concerning the care of the teeth, cleanliness of the skin, regularity of the action of the bowels, sufficient sleep and the avoidance of such bad habits as spitting. Children should be told that the daily cleaning of the bowels is a necessity for health, and regularity could be secured by keeping the same hour every day. Filth when allowed to accumulate in the body putrefies and poisons the whole system. Spitting should be taught to be a most objectionable practice. Apart from the filthiness of it, there is considerable risk of thereby spreading disease. Not merely is it a matter in which one should exercise self-control but it should also be taken as a duty to one's neighbours.

Diseases of the skin may be classified as follows. I. Contagious (a) due to animal parasites. Pediculosis and Scabies (b) due to vegetable parasites. Ringworm and Favus (c) due to microbes. Impetigo. II. Non-Contagious, Eczema, nettlerash, shingles, warts, Psoriasis, *Pediculosis* is due to the presence of pediculi or lice- There are three varieties of them—those which occur on the head, those which occur on the body and pediculus pubis. The two latter are found only on very dirty people while the first is very common among school going children. The louse is very prolific and propagates itself by nits. It causes irritation on the head which forms sores and crusts: Boys and girls are easily infected one from the other, and the remedy is to crop the hair close and apply parasiticides, *Scabies* or itch is often associated with dirt but not necessarily so. The parasite is called the itch insect. The insect burrows itself in the skin especially in the soft portions between the fingers and

hatches out in fourteen days. It causes intense itching and leads to scratching whereby crusts and sores are formed. It is extremely contagious and rapidly spreads to those near by. The disease is worst on hand and feet. The source of infection is the bedding and the clothing which have to be boiled and washed. The boy should be bathed everynight, the sores should be rubbed open, all the crusts removed and sulphur ointment applied. The whole house should be disinfected. This method repeated on three consecutive nights, is said to cure completely. Balsam of Peru, however is said to cure by a single application. The teacher should periodically examine the hands of pupils. He must not merely see that no dirt finds lodgement inside nails, but all pupils suffering from itch should be sent home until recovery. *Ringworm* is due to a vegetable parasite which grows upon the skin and penetrates deep into the roots of the hairs. It is most often found on the scalp, where several round scurfy patches are seen which ultimately join together to from large areas. The hairs in these area are very brittle and easily come out. The disease takes a very long time, from six to twelve months, to cure and so interferes with school attendance. A new cure by X-ray has been discovered which takes about eight weeks. The prolonged nature of the disease and its extreme contagiousness should convince teachers that every one suffering from the disease should be rigorously excluded from the classroom. *Impetigo* is common among school children and is usually found in the neighbourhood of the mouth or behind the ears. It is due to a microbe and is contagious in nature, If not attended to, the sores may spread over the whole head. The disease can be cured in about ten days. First the crusts should be removed and then some antiseptic should be applied- Among the non-contagious skin diseases *Eczema* is more common among infants than among little children. If is believed to be due to microbes but some think that it is due to external irritation. It appears chiefly on the places where the skin is moist—in the upper lip under the nose or upon the ears. The affected children should be sent to the doctor.

Postures.

Both the muscular system and the bony framework play an important part in determining postures. Bad postures lead to deformity, twisted spinal columns, malformation in chest, injured eyes, stooping habits, and shuffling gait. There are four occasions when we have to pay attention to the postures taken up by pupils. 1. When receiving instruc-

tion. 2. When reading. 3. When writing. 4. When standing. *Receiving Insruction.* In the ideal sitting posture the pelvis rests equally on the seat of the desk, the spinal column is erect and shows its normal four curves, the head is poised to afford relief to the muscles at the front and back of the neck, the arms balance, the hands rest upon the thighs which are horizontal. In such a position gravity takes the place of muscular exertion. Such a position, however, cannot be maintained for long without a support to the back. This is why the seat must be accurately fixed for the needs of the school.

Reading. When reading, the pupil must sit erect and the eyes must be at least 12 inches away from the book. When it is held nearer than this, short sight is likely to be produced. For easy reading the printed matter should be held at an angle of 45 degrees to the horizontal and not too much below the level of the eyes, if the head is to be kept comfortably in a good position. The eyes become much fati;ued if they are directed upwards or horizontally. There are several wrong postures taken up by pupils in which the chest and the abdominal cavity become compressed and are unable to do their function properly. The flattened chest contracted shoulder girdle and stooping head are constantly seen in practically every school. Such postures cause short sight, interfere with respiration and throw unnecessary labour on the heart. The abdominal organs are folded and compressed and forced into unnatural positions and round shoulders, curved spine and drooping head are the result of such postures.

Writing Bad positions in writing are a potent cause of spinal curvature. This curve has its convexity to the right which shows that it is produced because the right arm and hand are supported by the desk, while the left hangs unsupported. Writing requires the co-ordination of a large number of small muscles and hence involves great strain. In order to release the tension and fatigue caused by the writing, children assume all sorts of injurious postures. Attention to the following points would diminish the evils. 1. The method of writing for beginners. 2. The style of writing. 3. The manner of holding the pen. 4. The use of the left hand. 5. The position for writng. 1. Children should practise strokes, curves and letter forms on blackboard using crayons for the first 12 months. No particular size should be insisted upon at first, later they should be 2 inches. By standing the child avoids fatigue, and the movements are coarser and

more free. After one year the pupil may begin to write on paper at a desk; but it is better to begin with crayons. Pencils should be introduced in the third year and pens last of all. 2. As regards style of writing, a slanting style is bad. In order that a proper view of the line to be followed by the writing, may be obtained, it is necessary to place the paper to the right of the body and in an oblique position. The head is bent towards the left. The tip of the pen would obscure the letter if the paper is placed straight, The vertical style of writing is the only possible style which imposes a good posture on the children. It has many other points in its favour. 1. It is more legible and does not strain the eye. 2. It is more easily learned by children. 3. The writing point is equidistant from the eye and so involves no strain. 4. It can be used by the pupil sitting squarely in the desk, upright and with the paper parallel with the edge of the top of the desk. 3. Holding the pen. The hand should be resting on the little finger and on its side, so that the palm of the hand could be seen, while the pen-holder lies nearly in the depression between the index finger and the thumb and points to a direction quite outside the right shoulder. 4. The left hand. In the slanting style of writing, the left hand has little to do and it is idle. This leads to the left hand being drawn to the side and to the head's being bent, producing lateral curvature. The left hand should be constantly employed in holding the paper when writing. 5. Position for writing. The paper should be placed directly in front of the child with its edges parallel to the edges of the desk. It should not exceed 5½ inches in width. The pupil sits squarely in front, with the forearms placed equally on the desk and the elbows at equal distances (about a hand's breadth) from the sides. The feet should rest fully on the floor, and the top of the desk should be drawn to a minus distance of about 3 inches.

4. *For Standing.* For short periods the best position is where the heels are placed slightly apart and opposite each other, the weight being equally divided between the two legs. The hips should be drawn back, the head held well back with the chin drawn in and the chest thrown forward. This position could not be maintained for long periods. For long periods the body should be held in the same position but one foot must be placed in advance of the other. The weight of the body is carried by the posterior leg, the knee of which is held rigid, while the muscles of the other leg are relaxed and at rest. The position is varied from time to time by placing the other foot in advance and bringing

the weight of the body upon the leg that has been rested. Generaly, sitting with the knees crossed should not be allowed. Books should not be carried at the side as it tends to pull down the shoulder and to curve the spine.

Postural deformities are most likely to occur among children whose, bones, muscles and ligaments are weak. Weakness of the muscles should be avoided since that is why during periods of rapid growth postural deformities have a tendency to develop. *Lateral Curvature of the spine* or scoliosis is a common postural deformity. It is the deviation of the spine to one or the other side. If a posture involving this curvature is adopted for long periods by any child which is rapidly growing or whose muscles are weak, it tends to become fixed. The vertebrae inside are twisted and there is also a tendency to produce a deformity of the chest. As the curvature becomes more acute definite structural changes are brought about in the bones of the chest The symptoms of the complaint are early onset of fatigue, backache and tendency to stoop. Prevention is more easy than cure. The teacher should see that children do not take up faulty postures especially at times when they are rapidly growing or when their muscles are weak. *Round shoulders*, also called round back and stooped shoulders In this deformity there is an exaggeration of all the normal curves of the spine, the back appears rounded while the hollow in the small of the back is increased, the head is carried well forward, the chest is flattened and the abdomen is prominent. This deformity is due to muscular weakness aggravated by faulty postures in writing and clothing, the weight of which falls on the outer part of the shoulders. It is common in weakly rickety children and in adolescents. A cure can be effected by graduated and suitable exercises. Deep-breathing exercises are specially serviceable.

The Nervous System

We have already described the structure and functions of the nervous system. Now we shall consider the effect of its defects on other organs such as the sense organs. Meanwhile there are a number of children in every school who for one reason or other should be considered defective. In them certain centres of the brain are not well-developed and hence they are found to be feeble-minded. Such children attend the schooi but derive no kind of advantage from the ordinary school teaching, remaining in the lower .standards year after year, and learning very little if anything The

ordinary school methods are wasted on them and they may become normal only if specially treated. There are several kinds of defectives. It depends on the special centre affected whether auditory word, motor speech, visual word, or writing is defective. If the auditory word centre is affected the child suffers from word deafness. It is unable to understand or to remember what it is told; it even fails to recognise its own name. It is generally supposed to be deaf or imbecile. Instruction by articulating and writing, should be attempted. If the connection between the auditory word centre and the writing centre is affected the child could not write to dictation and if the writing centre itself is affected the child is unable to write altogether. Affections of the visual word centre make it impossible for the child to read or write. If the motor speech centre is affected the child's speech is defective. Such defects are to be found out only by doctors. Hence there should be medical inspection in all schools. Often, however, a boy looks dull or stupid due to common ailments which the teacher can easily find out for himself.

The Voice. As puberty is reached the vocal organs enlarge and there in an alteration in the voice. This change occurs at about twelve or thirteen in girls and at fourteen or fifteen in boys. While the voice is thus "breaking" there should be no sustained vocal exercises For clear articulation the manner of breathing is important. Children should be encouraged to use the abdominal muscles for respiration quite as much as those which raise the chest. Breathing by means of the abdominal muscles decreases the fatigue of a sustained use of the voice. To breathe properly in this way there must be no obstruction to the free movements of the diaphragm and the abdominal muscles. If the muscles of the neck are brought into visible play and the collar bones rise to a considerable extent, it is extremely likely that proper abdominal movements do not take place. Children should be taught to speak in their natural voice. *Stammering* is due to a lack of proper co-ordination of the various acts involved in fluent speech. The stammerer exaggerates the movement concerned with articulation, and underestimates the force of the expiratory blast necessary to produce the voice. The muscles of the tongue and lips are overstimulated and get out of control by being thrown into a condition of irregular spasm. Stammerers have no difficulty in singing because the expiratory blast is very strong. Three methods may be tried to help stammerers to a better utterance. 1. Find out the letters which give the greatest

difficulty and practise them alone and in combination with others. Vowels do not give much trouble, but only the consonants and especially those in which the pharynx takes no part, viz, P, F, Th, S, Sh, T, K, B, H, Ch, D, G; most difficult of all being the explosives B, P. T, D, K, G, 2 Insist upon the chin being raised and the chest being fully inflated before beginning to speak. All speaking should be performed with a full resonant voice. In bad cases the child may be encouraged to adopt a sing-song or intoning method of speech. 3. To acquire a proper nervous control the child should be encouraged to use his vocal apparatus continually. Mimicry and teasing by other children should be prohibited, as they make stammerers shy to utter.

The Ear consists of three parts:—external ear or the pinna, the middle ear or the tympanum, and the internal ear. The external ear serves to collect sound waves and to pass them through the auditory canal. This canal is about an inch long. Its mouth is full of fine hair and within are glands that secrete a wax. This wax entangles bacteria and insects that get in. The middle ear contains the tympanum or drum and the three little bones--the stirrup, anvil and hammer--which communicate the vibration of the tympanum to the inner ear. The internal ear is very much more complicated in structure. It consists of two parts—the osseous labyrinth made up of the semicircular canals and the cochlea; and the membranous labyrinth containing the two liquids, the perilymph and the endolymph with some minute crystals called otocenia. The membranous labyrinth is very well supplied with auditory nerves. The vibrations in the air set up by any sound are collected by the pinna, passed through the auditory canal and made to impinge on the tympanum. The vibrations of the tympanum are communicated to the internal ear by the three little bones. This sets the liquids and the crystals within the internal ear to vibrate and causes the nerve fibres to transfer them to the brain where a sensation of sound arises.

Defects of hearning offer very serious handicaps to education. The deaf child is also dumband hence, is without the means of communicating with his fellows. The knowledge which mankind has toilsomely collected through the ages is in a large measure picked up by hearing from one's fellows. The sharp-eared child whose ears are agape to hear what is being said around it, is informally being educated. The deaf child loses this informal education and even the partially deaf find it difficult to follow what is said in the class and

the task of attention imposes a great strain upon the nerves Outer ear deafness is caused by a plug of wax in the passage. Generally the wax dries up and falls out, but, in some cases an excessive amount may accumulate and block up the passage. In such cases the ear should be syringed and cleaned by trained doctors. If common people attempt to remove it with a towel or hairpins, it is pushed further in, and Middle ear deafness may result:— 1. From inflammation of the middle ear. Such inflammations may be caused by throat affections which are transmitted through the eustachian tube to the middle ear and may even result in the formation of an abscess. Presently the drum ruptures and a discharge appears. A discharging ear should receive serious attention, since it may result in a mastoid abscess which because of its proximity to the brain may end disastrously. 2. Thickening of the membrane of the drum or stiffness of the joints between the little bones in the middle ear will lead to deafness. 3. The presence of adenoids in the pharynx blocks up the eustachian tube. 4. Rupture of the membrane caused by a chronic discharge or by a loud report or by a box on the ear may result in deafness. Ear discharge and ear ache should be attended to by a doctor.

Two tests have been devised for finding out defects of hearing 1. The watch test. A stop watch with a fairly loud tick should be selected. Several people should be tested to find out the average distance at which it can be heard. A quiet room should be selected and distances in feet, and half-feet should be marked on the floor. The child should stand at one end of the marked line with eyes and ear closed. The watch would then be applied to his ear to make him familiar with what he should listen for. The examiner should then place the watch beyond the range of hearing and then move it nearer until the boy declares he has heard the ticking. This test is liable to mistake because the subject may imagine that he hears, especially when he recognises that the examiner's voice is also advancing. So a number of tests should be made before the result is accepted. 2. The whispered voice test. A quiet room about 20 feet long should be selected and a measured line marked on the floor. The child closes its eyes and one of its ears shows the open ear to the examiner who stands at the end of the room and asks something in a loud whisper. If the child answers rightly then it is proof he has heard the question, Here therefore there can be no mistake. The distance at which different pupils can hear can thus be found out.

The Eye. In school a child is surrounded by influences that are more or less injurious to its physical well-being.

Many of the organs, however, have a wonderful power of recovery. The eye on the other hand, being a very delicate organ, is more easily injured than healed. Any injury sustained by the eye is permanent. Hence it is better to remove eyestrain and to practise prevention than to attempt cure. Eye-sight is very important in life and those who have deficient eyesight are handicapped in the struggle for existence. They are unable in school to keep pace with children of normal vision and they suffer from headache, irritability, exhaustion, loss of interest, feebleness of will. The increasing percentage of shortsight among school-going children once again directs attention to the care of the eye. The eye has three coats. The outer is the sclerotic with the cornea in the front. The sclerotic is tough and is the only coat capable of withstanding any strain. It is the white of the eye, and is continued as the cornea which being transparent forms the window of the eye. The choroid is internal to the sclerotic is black in colour to prevent reflection and is a net work of blood vessels Under the cornea the choroid appears in the form of a special structure called the pupil. Interior to the choroid is the retina which is the sensitive medium. It is full of nerve endings which collect and proceed outwards in a large nerve. The contents of the eye-ball are the aqueous humour, the crystalline lens and the vitreous humour. The first, a watery liquid, occupies the chamber between the crystalline lens and the cornea. The lens is a translucent solid body situated behind the pupil. It is convex in shape. In early life it is spherical and soft. The vitreous humour is a jellylike substance inside the globe. These three substances are transparent and form the refractive media of the eye. All together act as a lens whose function is to bring the rays of light to focus on the retina.

Accommodation The power of the eye to adjust or focus itself so as to see an object clearly is called the power of accommodation. This is done by altering the convexity of the lens. The convexity of the lens is increased by the contraction of a small muscle inside the eye. The more convex the lens the greater the power it has of turning rays of light out of their original path and of causing them to come to a focus. Rays from objects 20 feet away are almost parallel and could be brought to a focus without much difficulty; but rays from near objects are divergent and require greater convexity to bring them to focus To do this the muscle has to contract more and this brings on strain and fatigue which may cause the distortion of the eyeball. *Short sight.* Strain on the sclerotic coat stretches

the eye from front to back and rays from distant objects will be focussed in front of the retina hence there would only be a blurred vision. Near objects however send divergent rays which require greater convexity in focussing and hence throw their image on the retina. This is known as the short sighted or the myopic eye. The remedy is to provide a concave lens which would disperse the rays of light.

Short sight is rarely congenital and is always acquired. The predisposing causes are heredity, malnutrition and constitutional disease, the determining causes are excessive convergence and congestion. The elongated sclerotic is not inherited; but a child may be born with a weak sclerotic. In malnutrition the sclerotic simply shares the general weakness of the body. Disease similarly makes the sclerotic weak and unable to resist the strain brought to bear on it, *Long-sight.* This is congenital. The eye is developed with its axle from front to back shorter than usual. Therefore the picture from a distant object would be focussed behind the retina. To bring it to focus the eye makes the lens more convex and succeeds in throwing the picture on the retina. But when near objects are before it, it finds that its powers of accommodation have been exhausted and so the object is not seen clearly. A convex lens would remedy matters. *Astigmatism.* Some children suffer from this congenital defect. The cornea in such cases is unequally convex. This interferes with the proper focussing of the object and certain portions of it appear dim. This defect could also be remedied by proper glasses.

Convergence. As we have said before, it is more fatiguing to see a nearer object than a distant one. Hence reading and school conditions are largely responsible for short sight. Therefore the following matters should be carefully attended to with regard to reading matter. The type should be plain legible and of the proper size. Clearness and spacing are equally imporant. The shorter the line the less fatigue it produces, because the eyes have to be moved less and the page should be well-broken up into sections and paragraphs. The paper should be opaque and sufficiently thick to prevent the print on the other side showing through. The surface must be dull and smooth and the best colour is a faint natural cream or gray. The colour of the ink should be jet black both for writing and printing. All fine work should be avoided. No child under seven should write letters less than half an inch in height. Large maps alone should be used. To avoid injury to eye-sigt, it should be seen to,

that the room is well-lighted in every part. The direction of the light should be from the left. No unreasonably fine object should be used. There should be no stooping over the work. The work should not be held nearer than 12 inches to the eye. No child under seven should read book print nor write small hand writing.

The following children require their eyes to be attended to. 1. All those with sore eyes. 2. Those whose eyes are congested and red. 3. Those who peer and blink when they wish to see anything particularly well. 4. All those who appear to be in difficulty when they are reading from map or diagram or blackboard. 5. All those who complain of head-ache or who appear to fear a bright light. All those who turn their head to one side when looking. 7. All who squint.

Fatigue.

Sandiford : Educational Psychology Chap. 13.
Claparede : Experimental Pedagogy pp. 209-320.
Teacher's Encyclopedia Vol. pp. 95-103.
Pintner : Educational Psychology Chap. 13.

The question as to what fatigue is, depends partly for its answer on a proper understanding of the relation between mind and body. This we have already described. In olden days people thought that the mind was the guest of the body. The relation was only tangential. The spirit can free itself from the bonds of flesh; and it was assumed that the relation was one of hostility. Holding this view, men believed that they should castigate the flesh to elevate and purify the spirit. At the present day, we think differently. Locke said that a sound mind can be found only on a sound body and Rousseau, that a weak body enfeebles the mind. We hold that the body supplies the mind with energy; and that all mental activity involves the expenditure of energy generated by nerve cells. These nerve cells have nuclei which store the energy. As soon as stimuli are received through the nerve strands this energy is released and is carried through other nerves to serve the purposes of reaction. To repair the loss to the nerve cell and to remove the poisonous waste material created by cell action, a blood supply is necessary. The blood stream takes time to do this. If the exertion is continued fast and if the breaking down goes on apace, while the building up does not keep pace with it, the cell is bound to be depleted of energy. The waste material containing toxic bodies clogs the working of the cell and the cell

becomes weaker and weaker. This has been experimentally demonstrated by Hodge who showed that the nerve cell of a frog appeared very shrunken after six hours of electrical stimulation.

When we have thus demonstrated fatigue as the result of an excessive expenditure of energy, we are in a position to understand the distinction and relation between muscular and intellectual fatigue. It is a well-known fact that the muscles get tired after continued work. This is why we are not able to walk indefinitely long or carry a load for long distances. The machine invented to measure muscular fatigue is the ergograph where the bending of a finger is indicated by carbon lines on paper. After some time of continued flexion, the lines grows shorter and shorter showing thereby that the bending becomes more and more imperfect, with the onset of fatigue. Muscular fatigue is related to the condition of the muscles while intellectual fatigue is connected with the condition of the nerves. Still so far as the muscles depend upon the nerves, when the nerves are fatigued the muscles fail to function, and even if the muscles are fatigued, it is possible to stimulate them by the will. This is why the success of an athelete is said to depend on his "nerve". People who had a shock or who have been frightened feel weak in the knees. After a hard day's work, servants break dishes, Hence it is said that all fatigue is at bottom only of one kind. The poison produced by muscular exertion gets into the blood stream and circulates through the brain rendering it less capable of work and conversely severe mental work renders one incapable for physical exercise. "A twenty mile tramp is not the best immediate preparation for hard intellectual work. Prolonged mental exercise may cause muscular fatigue..." Two rabbits were selected—one very well-rested, the other which had worked on a treadmill for a considerable time. Blood from the second rabbit was introduced into the first which, as a result, showed all the signs of fatigue. So fatigue is caused by certain toxic bodies in the blood and is of the same kind whether intellectual or physical. "Fatigue is the feeling of pain with difficulty in taking action. It is a subjective impression united with an objective impotence". Hence fatigue has been measured by two kinds of methods—objectively or directly by the work turned out by the person, subjectively or indirectly by his physiological condition.

In all these methods of measurement certain tasks are imposed upon the pupils both when they are fresh and after

they had an hour or two of class work. The extent to which the performance deteriorates in the second case measures the extent of the fatigue. There are several direct ways of measuring fatigue. Passages of equal difficulty may be dictated before and after fatigue and the number of mistakes counted and compared. Similarly certain letters in the alphabet may be set to be counted or left out of a passage. Arithmetical calculations may be set, the quality being judged by the number of mistakes made, and the quantity by the amount worked out. Blanks in a sentence may be asked to be filled up and pieces may be set for memorising. These methods have the advantage of measuring fatigue directly, of looking remarkably like the ordinary school work and to lending themselves easily for group working. But it is hard to find tests of identical difficulty, to allow for the fatigue caused by the test itself, for the facility that comes with practice and for willingness or otherwise. Again errors may be due not merely to fatigue but to ignorance, confusion and unskilfulness. Indirect measurements use instruments. The *Aesthesiometer* which measures the distances at which different portions of the skin recognise the two points of a compass as distinct, shows increasing distances after fatigue. The *Algesimeter* consisting of a point fixed on a spring enabling the pressure exerted on the spiring to be measured, gives lowered readings after fatigue. The *Dynamometer* is for measuring hand grip. It consists of a steel ellipse which when taken in the hand and pressed indicates the pressure thus exerted on a clock face scale. The force of the grip diminishes with fatigue and increases with rest. Mosso's *Ergograph* consists of a string at one end of which a weight is hung, which is raised or lowered by the flexion of a finger attached to the other end. The extent of the rise in the weight is indicated by a line drawn by a carbon pencil on a piece of paper. These lines diminish in height with the onset of fatigue. The time for reacting to a stimulus as measured by the *chronoscope* increases with fatigue. The length at which a point is seen double by the eye also increases with fatigue. These methods are not completely reliable because, the subject will vary in performance with varying attention, interest and practice. It is difficult to isolate fati,ue in its pure state. The use of physical fatigue as a measure of mental inability rests on unproved assumptions in regard to the relation of mind and body. The use of instruments again has shown that certain physical states accompany certain mental states but nobody has proved concomitance between them. Therefore, the only hope of measuring fatigue is the direct measurement of the

loss of efficiency of a mental function through continuous practice. Such experiments have been made by the Japanese Miss Arai upon herself through mental multiplication; but the loss in efficiency after prolonged periods of hard mental work was very small.

The experimental determination of fatigue has taught us certain lessons. Practice works contrary to fatigue; and so after a certain period the performance improves in quantity and quality. The "fatigue curve" also shows "spurts". The subject finding the work waning makes a determined effort. There is the "spurt terminal" and the "spurt initial". There is also a factor known as "getting up steam" which means that it takes time before a person can get into good form. If after a period of work some leisure is given say 5 minutes, it has a favourable effect upon the performance; but if the period is increased to 15 minutes, the work suffers. This is due to the factor called "swing" or "animation". The very fact of working stimulates us, puts us in the mood for work, in a specially favourable humour for activity. Thorndike's investigations have thrown doubt even on these findings.

There are several factors which influence fatigability 1 *Age*. Fatigability decreases with age but it rises abruptly at 8 years, at 13-14 years, and at 16 years. We know that this is because at those periods the body is growing rapidly and every ounce of energy is consumed therefor. 2. *Sex*. Girls are more easily fatigued than boys. 3. *Intelligence*. The dullards are less fatigued because they work at less pressure while the intelligent are highly strung. 4. *Individual differences* make themselves felt. Some are capable of increasing work where the mistakes go on decreasing throughout the day. In others the work goes on decreasing and the mistakes increasing. Then there is the convex type rising at the beginning and then decreasing while the last is the concave type which decreases from the beginning.

5. The time of day determines fatigability. The first hours of the morning and the afternoon are most unfavourable. At first the pupils have to settle down. Then the advantages of practice, swing, animation, tell and then fatigue sets in. The recess recuperates; but the meal interferes with the work. There is a partial revival in the afternoon but a greater fall in the end. 6. The day of the week. If the fatigue of the previous day has not been slept off and

continues into the next day as the week advances fatigability increases. The early hours of Monday are not good; but Monday and Tuesday are the best. On Wednesday lassitude commences and if the evening were a half-holiday the pupils might recover on Thursday and Friday will be fair, Saturday will again be a half-holiday and on Sunday they will recover completely. But Thorndike has proved that even here it is more boredom than fatigue and that if we give work which enlists the interests of the pupils, they do equally well at the end of the day as at the beginning. 7. Change of work was originally thought to be of great importance because new centres will be exercised while the old ones can rest. This theory has suffered much with the advent of the conception of the energic relation between mind and body. Still it is possible that we get wearied of an occupation. 8. Body position determines fatigability. The horizontal position is the least, fatiguing. Anything that aids the flow of blood into the brain diminishes fatigue. 9 Different subjects have different co-efficients of fatigability. Mathematics has a ponogenic co-efficient of 100, Gymnastics 90 History, and Geography 85, Natural Science 80, Drawing 77. In the time-table the fatiguing subjects should come at such a time when the pupils can resist fatigue. 10. Physical exercise is not a remedy for mental fatigue but exercise by quickening the respiration and the circulation hastens the removal of waste material. 11. Symptoms of fatigue are agitation, twitching, grimaces, yawning, inattention, blunders, memory and speech troubles, stammering, desire to play, restlessness, wool gathering, mind wandering and faulty posture. Chronic fatigue may be found out by the depression of the angles of the mouth, persistent horizontal furrows in the forehead, sunken appearance of the eyes, hollows round the eye, dilated pupils, wandering eyes, vacant expression, jerkiness, fidgetiness and want of grace in movement. Fatigued children are cross and irritable, are not able to concentrate attention, have a poor appetite, soon forget what they learn, and are restless during sleep. The final end of over pressure is nervous breakdown-12 *Rest* is the only cure for fatigue. It gives time for the blood to do its work. When to rest, how long and how? We might rest when fatigue comes or before it or we might not rest until we have done our work. Rest coming too soon is harmful, a rest of 15 minutes after an hour's work destroys the swing and the practice effect. With this is connected the period for which a lesson should continue, 6 yrs. 15 mins: 7 to 10 yrs. 30 minutes, 12 *Sleep* is nature's own sweet restorer. The mind is at rest and so the blood does the work. We all look

fresh after a good night's rest and are in a position to take up the work of the day again. Children build up during sleep and so they should have plenty of sleep.

Conclusions. 1. There are differant types of individuals where fatigability is concerned 2. Fatigability depends on age. 8. Sixty minutes are too long for any one lesson. 4. Formal school-work should never exceed five hours a day or 25 hours a week. 5. The forenoon is more favourable for work than the afternoon. 6 Homework should be reduced to a minimum, and should be so arranged as not to require more intensive application. 7 Short pauses with free play (but not gymnastic) are good offsets for fatigue. 1. A short spell of rest affects disadvantageously even a long spell of relatively easy work. 9. The noon-intermission fails to have a recuperative effect because the afternoon's work begins before digestion is sufficiently advanced. 18. Pupils should get from 9 to 10 hours of sound sleep which is the best protection against overburdening. 11. Change of work does not increase the store of energy but sets aside *ennui*. 12. Exercise in the form of play consumes energy but removes waste products more rapidly. 13. Gymnastics is a source of fatigue for many people. 14. Fatigability is a function of three, the teacher, the method and the subject of instruction. 15. The hard subjects should be brought in early in the morning, hard and easy subjects should be alternated and pauses should be frequent and progressively long.

Medical Inspection

The best way of ensuring all the advantages of School Hygiene is by providing for Medical Inspection. Medical inspection of schools is necessary because every school contains a number of pupils suffering from infectious or easily preventable and remediable diseases which teachers and parents fail to detect. The inspecting doctor could easily discover such pupils and adopt measures to cure them, Moreover by seeing that adequate care is taken within the classroom, the school doctor will be able to prevent school life injuriously affecting children. Medical inspection of of schools should secure the physical welfare of every child, the maintenance of hygienic conditions within the school, the adoption of educational means, to the needs of special groups of children, and their classification according to their mental and physical capacities.

There should be medical inspection of children immediately before, or at the time of, or as soon as possible

after, their admission to an elementary school. Four inspections of each child are suggested;—the first on admission to school at about the 5th or 6th year, the second when transferred from the infant to the Senior departments. i. e., about the 7th or 8th year, the third at about the 10th year, the fourth at about the time of leaving the school i. e., about the 13th year. The first inspection should be in the presence of the parents and need be only cursory, attempting to detect only gross physical defects and uncleanliness. Unclean children should not be admitted and the attention of parents should be drawn to squints, defective teeth and deformities. The second inspection should be more searching taking ten minutes in each case and should be conducted in the presence and with the help of the class teacher who should help with his personal knowledge of each child. An examination should be made of vision, hearing, teeth, tonsils, adenoids, heart, lungs and mental capacity. The last is to decide on the special methods to be adopted. The third inspection, will be of the same type as the second and is meant to detect any changes that may have taken place. The fourth and last inspection is to enable the teacher and the doctor to choose the most suitable occupation for every abnormal child.

Generally speaking, the Medical Inspection should concern itself with the height, weight and chest measurements. These give us some notion as to whether the growth and development of the child is normal or not. For this purpose there should also be observations taken of the personal appearance and of conditions of nutrition. Detailed inspection should be made of the children's state of cleanliness of body, head and clothes. The doctor may also note whether the teeth are being properly cared for or not. The eyes and eyesight should be carefully examined and the ears and hearing should be tested The nose and throat should be investigated and the existence of deformities noted down. The observations of the doctor should be noted down under separate headings in the health card and the result, should enable tho school children to be classified under a number of general headings. The teachers are expected to help in the medical inspection. They should all receive some kind of instruction in Hygiene and some should be specially deputed for the work. The teachers are the chief instruments in any scheme of medical inspection. On them should fall the preliminary work, the weighing, the testing of eyesight, and the care of children marked out for special observation by the doctor. The

co-operation of parents should be fully ensured. They should be present for the first inspection of their children. The presence of any diseases and the means of preventing or curing them should be notified to the parents. Such co-operation is made possible where there is a school nurse who acts as a sort of "go between" between the school and the parents. She visits the school, comes to know of the history of each child and is able to advise parents on the measures to be taken for the health of their children and undertakes the surpervision of such measures. She is thus able to provide "the following-up" without which the good effects of medical inspection cannot be obtained.

Physical Education.

Our ideal in education is a rounded development and we cannot therefore afford to neglect the development of the body. Many a senior wrangler who has developed his mind to the almost complete neglect of the body, has found the impolicy of it when later in life he is outstripped by men who have better muscles than him. For the development of the body physical exercise is absolutely indispensable. It increases the rate of respiration and circulation thus facilitating the removal of waste matter from the body and of ensuring the supply of building material for the tissues. If the muscles are not properly exercised the debris caused by the heat of the body would clog the brain in the end and make it difficult to do mental work also. The muscles like any other organ improve by use. They waste away when we have been confined in bed for a long time by illness. If a blacksmith becomes a clerk the powerful deltoid muscles developed by wielding the hammer soon become insignificant. But if a clerk becomes a blacksmith, he soon develops the deltoid muscles prodiguously. Hence exercise is necessary for muscular development and it is all the more indispensable in these days when an artificial civilization has made it unnecessary that we should exert ourselves physically. Exercise is necessary for all people and at all periods of life but it is most essential for the growing boy whose body is in process of building.

The aims of physical education are five in number (1) The promotion of normal growth and organic development. (2) Development of certain social qualities such as co-operation, loyalty, leadership, spirit of fair play and proper spirit towards victory and defeat (3) Development of certain personal qualities such as alertness, decision, perseverance

personal qualities such as alertness, decision, perseverance courage. (4) the engendering of permanent habits of exercise and play and (5) the giving of health instruction.

Exercise in order to be useful must be systematic. It should, not be entered into fitfully. It should take into account the evil effects of school life on the body and bodily organs and serve to counteract them. Any system of physical exercises should try to give beneficient exercise to all the parts of the body that require development. The Swedish system is the most systematised and hence is more or less universally adopted. The exercises should be properly graded and must proceed from the simple to the complex, and the easy to the difficult. Breathing exercises may be given at all times and hours. Exercises for elementary schools have been grouped as follows: Introductory such as falling in, numbering, opening ranks, arch flexions, heaving, balance, shoulder blade, abdominal, lateral trunk, jumping and respiratory, exercises. An exercise or exercises should be selected from each group. Violent exercise should not be taken as it may lead to heart strain. The actual duration of a lesson must to a certain extent depend upon the age and ability of tbe pupils. A physical training lesson for a schoolboy between 8 and 10 might vary from thirty to forty five minutes, a lesson of 43 minutes is well suited for boys of ten and over, while an hour is not too much for older boys. Spasmodic training serves no useful purpose and so the lessons should follow each other sufficiently closely to ensure the physiological effects being continuous. Hence there should be at least three physical training lessons per week in addition to the games periods.

Games are no substitute for physical training. Only the healthy and the exuberent join the games and it usually happens that only a minority in the school takes part in sports and athletics. Games will not correct the faulty carriage, crookedgrowth, and general tendency to unequal development so readily acquired at the school desk. But that does not mean that games should be discouraged. Quite the contrary: the school should organise them. A training in games and school contests tends to give perception and judgment, courage and skill, coolness and quick decision. All must play; for the benefits conferred upon mental and physical development by play are incalculable. Games implant certain ideals of character and conduct. "They are these, that a game is to be played for the game's sake, and that it matters not a button whether it is won or lost, so long as both sides play

their best; that no unfair advantage of any sort can ever be taken, and that within the rules no mercy is to be expected, or accepted, or shown by either side: that the lesson to be learned by each individual is the subordination of self in order that he may render his best service as the member of a team in which he relies upon all the rest and all the rest rely upon him; that never on any account must he show the white feather" (*Norwood:* The English Tradition in Education p. 109).

Some of the physiological effects of exercise may be noted. The muscles are increased in size, made more capable of doing their work and brought more under the control of the will. The heart beats quicker and there is an increased flow of blood. This ultimately leads to the walls of the heart and the arteries being strengthened. Respiration is quickened and waste material is thrown out at a rapid rate. A man at rest takes in 480 c. in. of air a minute. This is increased to 1550 c. in. while walking at a speed of 3 miles an hour and to 3250 c. in. at 6 miles an hour. The skin acts freely and a great amount of sweat is got rid of. The nervous system is exhilarated and strengthened, the appetite and digestion are improved, and the work of the kidneys and bowels are accelerated.

Extracurricular Activities.

Mckown : *Extracurricular Activities.*
Roberts and Draper : *Extra class and Intramural activities.*

In speaking of Physical Education, we have passed out of the strict limits of the curriculum. Yet it is an important part of school activity. The number of such activities which stand outside the curriculum but which are given scope for, in school work, is increasing. Their importance may be gauged by the overstatement that soon "extra curricular activities will become curricular, while curricular activities will be tolerated only as extras." Extra curricular activities have risen in importance, because school life is being increasingly looked upon as preparation for citizenship. By merely learning the essentials of citizenship, one cannot hope to become a good citizen. Practice should be provided which could be had only by participation in the life of a school community. Class activities do not offer much scope for social relationships. Hence extra curricular activities which provide many such opportunities have become a necessity in the school organisation.

The aims of extra-curricular activities are many. Firstly, they are meant to prepare the student to become the member of a democracy. If the school discipline is organised under a student council, the position of a student in the school is analoguous to that of a citizen in a democratic state. So it provides experience in the life of a democratic society. Secondly, democracy means individual freedom and consequent individual independence. A citizen of a democratic society should be capable of self-direction. He should be able to order his own affairs and to take responsibility for them. Extra-curricular activities invest him with responsibility, and give him practice in self-direction. Thirdly, extracurricular activities aim at teaching cooperation. The pupils are socially cooperative in the student council, in the games field, or in the school day celebration. Fourthly, they aim at building up a sentiment of loyalty and affection for the school. The more the students "run" the school, the more they feel they have a part in it, the more proud they are of belonging to it. Fifthly, extra-curricular activities help to maintain discipline. No discipline is so good as self-discipline and in the free school, pupils learn to control and discipline themselves for common and social ends. Sixthly, extra curricular activities are designed to give scope for special aptitudes. Some one has a talent for music, another for writing, a third for acting; and it is only right that the school should bring out these abilities and develop them.

Certain principles should be kept in mind in organising extra-curricular activities. They are possible only in schools which are organised, to a certain extent at least, on the principle of freedom. The pupil should be considered a citizen of the school with rights and obligations. The school should consider it part of its duty to organise an extra-curricular programme as an integral part of its curricular work so that it may motivate the latter and give it added interest. School time may be given for them as in the Dalton schools and all pupils should participate. In appointing teachers to the school, their qualifications for leading and sponsoring extra-curricular activities should be considered. Such teachers should not dominate the organisations under their care, but should counsel and guide them.

A typically extra-curricular organisation, is the Student Council. Representatives from each class may be elected and may sit with members of the staff to discharge some of the duties connected with the school.

It may be put in charge of student discipline, of athletics, assembly programmes, publications and civic life. Each one of these functions may be discharged with the help of the appropriate committee which coopts members and is advised by a staff member. Thus cases of indiscipline may be taken up by the Student Court, the celebration of the School Day may be carried out by the assembly programme committee; the publications committee may issue the school magazine and the school annual and the civic committee may care for the Bulletin Board, school cleanliness and so on. It is not necessary to speak here about the School Literary association and the Athletic association. So we proceed to discuss two of the newer organisations.

The Boy Scout and Girl Guide Movements

Teachers' Encyclopaedia Vol V, pp. 12-19
Young: New Era in Education pp. 160-174.
Report of the New Ideals Conference 1916 pp. 56-78.
Baden—Powell: Scouting for Boys.
Macnee: Op. Cit. Chap. 15.

The Boy Scout Movement was founded in 1908 by Sir Robert Baden—Powell, the heroic defender of Mafeking. He was a fit personality to appeal to the juvenile mind. A fearless soldier, his jocose telegrams and never failing spirits in face of an investing enemy made him a hero in the eyes of boys. He himself was induced to turn from soldiering to the education of the next generation because even in the army he was charged with the duty of training young men. He found out in what respects their education was defective. Three main defects were noted by him. The first, was the need for the education of the public, of parents, pastors, employers and teachers themselves, who did not look far enough ahead. Secondly, in the education of the child itself be felt there is a necessity to educate the child from within instead of to impose instruction from without. The third requisite of present day education is the welfare guardianship and after care of the child. You must follow the child outside the school and choose the right career for him. Many are failures not because thay are "unfits" but because they are "misfits". Instead of the educationist laying down the aim of education, if only the public will do so and call upon the teacher only to take steps to attain the end, the products of our schools will be less of a misfit on society.

On the basis of this aim, four component objects have been kept before the mind of those engaged in the training

of boys. First, character and self-development by the boy in all those different attributes which go to make a good manly citizen. Secondly, it is attempted to make him useful in his particular way to himself and to others by making him a handicraftsman in some form or another; to develop habits which will have educational value. Thirdly, scouting aims at teaching service for others, which is the basis of religion whatever form it may take, his duty to his neighbour, his patriotism and his ideal of self-sacrifice on behalf of others or of the State. Fourthly, it aims at conserving and cultivating the boy's physical health and well-being by putting it in his own keeping.

It was discovered that these four objectives could be achieved by scouting. By scouting is not meant military work, but it may be spoken of as peace scouting which, beginning with the knights of old, continues through the Elizabethan adventurers and the latter day explorers, and is now usual with frontiersmen of the British Empire in every corner of the world. These men are accustomed to live on their own resources, taking their lives in their hands, brave and loyal to their employers, chivalrous and helpful to each other, unselfish and reliable,—men in fact of the best type. It is this type of character and attainments that scouting aims at teaching to the boys through the methods of saving life, of understanding nature, of correcting the narrowing tendency of town life and in expanding the juvenile thinking powers. In India scouting has a special mission, in that it could teach the dignity of labour, good fellowship, practical efficiency in social uplift and the spirit of adventure.

The details of scout organisation are well-known. The strongest unit is the troop which is divided again into patrols each under its boy leader bearing the designation of some animal or bird such as the lion, the bear, the plover. The troop is generally under a scoutmaster, generally a gentleman of education, position and experience. Enrolment as a scout is restricted to boys not under 12 years of age who have the consent of their parents. Before enrolment they are expected to be acquainted with the scout laws, signs and salute; they must be able to tie the reef, sheatband, clove, hitch, bowline, middleman's fisherman's and sheepshank knots. They then take the scout's oath "On my honour I promise that (1) I will do may duty to God and king (2) I will do my best to help others, whatever it costs me; and (3) I know the scout law and will obey it". He then becomes a tenderfoot and may by qualifying in the

undermentioned tests, be made a Second Class Scout 1. have one month's service as a tenderfoot 2. possess a knowledge of elementary First Aid and bandaging 3. an elementary knowledge of the Semaphore or Morse systems of signalling 4. track half-a-mile in 25 minutes or if in a town describe satisfactorily the contents of one shop window of every four after one minute's observation of each, remember sixteen out of 24 well assorted small articles after one minute's observation 5. go a mile in 12 minutes at Scout pace 6. lay and light a wood fire using not more than two matches 7. cook a quarter of a pound of meat and two potatoes without utensils other than the Billy 8. have 6d in the Savings Bank 9. have the ability for boxing the compass.

He can become a first class scout if he has the following attainments (1) swim 50 yards (2) Signal, send, receive a message either in Morse or Semaphore at the rate of 16 letters per minute (4) journey 7 miles on foot or boat and return, or at a pinch 15 miles and return, and write a report thereon (5) describe the proper method of saving life in two of the following:—fire, drowning, runaway carriage, sewer gas, ice break, electric shock, or bandage an injured patient, or revive an apparently drowned person (6) cook certain dishes satisfactorily (7) read a map and draw a rough sketch, and point out a compass direction without the aid of the compass (8) use an axe for felling, trimming light timber or to make an article of carpentry, joinery or metal work (9) judge distance, area, size, number or height and weight within an error of twentyfive percent (10) bring a tenderfoot trained by himself in the subjects required for that position.

Further incentives to efficiency are offered by the award of all round cords and promotion to "King's Scout" and "Silver Wolf". The King's Scout should have 6 proficiency badges. He must be a first class scout and pathfinder, and pass three of the following tests:—ambulance, bugling, cycling, markmanship, seamanship, signalling. For Silver Wolf 24 badges should be earned, of the following,—aviator, bee-keeper, blacksmith, carpenter, clerk, cook, cyclist, dairyman, electrician, engineer, farmer, fireman, gardener, handy man, horseman, interpreter, leatherworker, musician, pathfinder. pioneer, photographer, piper, plumber, poultry farmer, printer, seaman, signaller, stalker, etc.

Such a training cannot fail to increase and cultivate the boy's intelligence, powers of observation and physique, and raise his value in the labour market. First of all it makes

for a more thorough acquirement of some of the subjects in the curriculum since it introduces them through the Play Way. Mr. Young mentions the case of his class work in map reading and how it was a trial to the boys in the olden days and how it became a pleasure when it was introduced into the scout clubroom. The sense of honour is conveyed by the scout's Promise and the Law. Discipline is put into him through team games. A sense of duty and responsibility is ingrained by the patrol system. Resourcefulness is encouraged by means of badges. The boy gets practical religion by having to do a good turn every day and he acquires the ideas of the social basis of all religion and of fair play and a sense of justice. The scouts make themselves adepts at some handicrafts of which there are more than fifty to choose from. Scouting is meant to improve the physical health of the boys. The average weight and height of each age have been determined and where individual boys fall short of these, exercises which would bring them up to the standard are suggested. The scout is asked to be clean and he is told how to take care of himself. The scout movement has now been introduced into most schools and is expected to remedy some of the faults of the older education. The girl guides make use of occupations which appeal to the feminine mind and are of value in a girl's life.

Principles of School Organisation.

P. A. Barnett: *Teaching and organisation*
Bray : *School Organisation.*
Wren : *Indian School Organisation.*
Fitch : *Lectures on Teaching.*
Mackenzie : *Instruction in Indian Secondary Schools Chaps. II & III.*
Raymont : *Principles of Education Parts IV & V.*
Strayer : *Brief course in the Teaching Process.*
Adams : *Modern Developments in Educational Practice.*

We have spoken of the furniture of the school from the point of view of hygiene; we shall now speak of them from the point of view of good teaching 1. Cupboards. Each classroom should have its own cupboard for current stock. Cupboards built into wall recesses give a neater appearance to the schoolroom. 2. Book cases should be glazed to exclude dust. 3. Museum cupboards or specimen cabinets are also generally provided. The best are long shallow glazed boxes which allow specimens to be inspected without removal. Very often they are made to contain only such

objects as are likely to be generally useful in illustrating lessons : but some think that it would be broadening, if they are also used for the collection of curiosities, especially as it would form a link between school and home.

3. Stands of different kinds are required for displaying maps, for holding drawing models, and objects for demonstration and for umbrellas. Stands for drawing models are either small tables, pedestals or stems. The only point to be noted as regards umbrella stands, is that they should be provided with a zinc or iron bottom to receive the dripping during the wet season. 5. Easels are used to hold blackboards or drawing boards in a nearly upright position while maps are suspended vertically on stands. The height at which the blackboard should be held is adjusted by means of pegs placed in holes, and many have an arrangement like a T—square which when raised might be used for suspending maps. But this arrangement is not the best, for the map hangs over the Board which would not then be available for writing. 6. Blackboards on easels are the best for they could be removed to any part of the room. They can be raised or lowered and the angle changed to suit the light. Both sides are available. They can be reversed or taken down when the teacher wants to conceal what is written. The swing slate board has almost all these advantages. It is also common to have blackboards on the walls. Some slide on the wall and are made of slate. Others are merely varnished wall surfaces and run dado. They are not adjustable and are useful for having information which has to be preserved for a comparatively long period. 7. Notice boards should be covered with green baize on which notices could be stuck with pins. If enclosed in a glass case and padlocked the notices will not be tampered with. Each school should have a copying machine, for multiplying examination and other papers It may be a cyclostyle or a hectograph.

The Staff

Having disposed of the material requisites of a good school, we come to the personal requisites and among those required, the headmaster is the most important. Schools rise or fall according as the headmaster is good or bad. Great headmasters make great schools. The great headmaster is born as well as made. He must be born with certain qualities, characteristics and abilities such as fairness, tact persuasiveness, dignity, resourcefulness, personality, purity of character, self-control, organising power, sound judgment,

and broad sympathy. He must also learn from the experience of others. He should command great prestige among pupils, which will prove of real use in managing and directing pupil activities in the proper channels.

The headmaster must be usually the hardest worked member of the staff. Till now he had charge perhaps, of the mental, moral and physical welfare of thirty boys; now of 300 boys, by way of supervision. His duties fall into four classes, organisation, supervision, teaching and examination. He must direct, supervise the staff, see to the care of the school building, furniture and apparatus, to the classification, time-table, curriculum and records, school discipline and tone, school hygiene, games, hostels, dormitories, admission, registration, examinations, promotions. The headmaster should not do too much teaching. A little of it spread over the school would do good and will bring him into touch with the pupils. But too much of it takes him away from important duties, which does not mean that he should become an office drudge and slave at his desk from 10—4; (Read Wren p.6-7 for the headmaster's day).

The headmaster's supervision of the teacher's work should be seriously undertaken. He should not get information from pupils. He should go and question the class and watch the teaching. He must look over the notes of lessons and his criticism should be helpful. A number of visits should be made before pronouncing final judgment. A teacher should be judged by his actual teaching, by his preparation, by his knowledge of subject matter and by his personal appearance. The headmaster should write his opinion in the inspection book and give due credit to any improvement found in the teacher as a result of his inspection. The headmaster should be 1/ in life and character a pattern to the staff 2/ remember that the examination is not the be-all and end all of education 3/ be dignified but sympathetic 4/ request rather than command 5/ assist loyal colleagues 6/ Eliminate disunion among staff and prevent discord 7/ Secure the confidence of parents. 8/ should not find fault with teachers before the boys 9/ take interest in games.

The *Distribution* of the staff. The staff in an Indian school consists of strange elements. Every member is like everyone else. Each had gone through the same course and is more or less like the other in tastes, abilities and aspiration. Some of them have a great deal of knowledge and a gift for imparting such knowledge and a love for boys.

Such prove a success very early. Others take up the work because they should earn their livelihood and be no longer a drain on their parents. If these are fond of teaching and have a love for boys, they soon make good, by study and steady application. There are others who have taken to teaching as a pot-boiler, when they are completing their law course or are looking out for employment elsewhere. These are the undesirables who should be eliminated. The only claim that many have to teach, is that they have a university degree. "He is a graduate, therefore he can teach" is a maxim which is not always true. The university does nothing to make them good teachers. The professors are lecturers and not teachers, and their models do not stand them in good stead. So these teachers fall back upon the methods of their old schoolmasters. Training Colleges do good work, but it will be wasted until the knowledge of theory obtained in them is applied to practice. Hence the staff contains all sorts and conditions, some trained, some untrained, some zealous, others marking time, some young and athletic, others awaiting pension. The headmaster has to make the best use of them.

It is sound principle to give the best teachers and the good disciplinarians to the lower classes. The best 'direct method' teachers should be put into the lowest standard. The most learned of the staff and the best examination coach should be assigned to the highest class. This leaves us with the middling good and the weaker sort, for the middle classes. There should be no odium attached to the teaching of the lowest class; indeed the lowest class should be considered the post of honour. There are three systems under which the staff of a school may be distributed—the classteacher system in which the teacher takes the same class year after year, in the second the teacher advances with the class, in the third or the specialist system each takes a special subject or subjects throughout the school. 1. The class teacher system has certain advantages. The teacher who has had experience in teaching the same class for a year or two, has a thorough grasp of difficulties in the way, and the best methods to be employed. The disadvantages are, that he fails to know his pupils intimately, as they are changing every year and his experience of school work becomes limited. Without variety interest flags. Thus when experience becomes cribbed cabined and confined, the teacher loses much of his usefulness 2. The system in which the teacher advances with his class has its usefulness. The teacher gets a deeper insight of his pupils through long association and

is able to leave his impress on them. There is variety and interest in the work and a widening of the teacher's experience. It has its disadvantages though. The pupil's outlook is narrowed by being confined to contact with only one teacher. There is a certain amount of specialised ability in teachers. Some are good for the lower classes, others for the higher. The effect of a weak teacher following with his class will be ruinous on the batch. The pupil is to get the moral impress not only of one person, but of the whole school.

The third system is known as specialisation. It has many advantages. The teacher does best in the subject in which his knowledge is greatest. Interest in the subject ensures method, zeal and broad treatment. The teacher is able therefore to present his subject vividly. The scholar has the opportunity of finding his true bent. The outlook of the pupil is widened by contact with a number of teachers. The specialist can unify instruction in his subject in the whole school. But it has a few disadvantages. No one teacher has moral control over the pupils, his work being scattered over the whole school. When the school tone as a whole is good this defect is negligible. It results in divided responsibility for the class as a whole. Even though one teacher is made responsible for attendance, registration, punctuality, stock, tone and discipline, on account of the large number of hours devoted to the class by him, still his influence cannot be as great as when he is in sole charge. It imposes a great strain on the teacher and provides little variety.

Hence a more liberal staff will be called for. Each will push the interests of his own subject to the neglect of general training, so that any subject that has a masterful teacher would get a prominence out of all proportion to its educative worth. Specialists suffer from a narrowness of vision. Not all teachers are qualified by tact and temperament to handle every class. A combination of the specialist and the class teacher systems, appears to work best in practice. The class teacher is interested in his class, and the subject master in his subject. The one system gives full scope for personal influence, while the other is good so far as coaching for examination goes. Given the permanent teacher in sole control of the class and responsible for its mental, moral and physical education, the visiting teacher of a special subject may be very useful (*Raymont:* pp. 300-302, *Wren* p. 23 and *Bray* pp. 95-108).

Teachers' Records.

The teacher must maintain the following records, attendance register, mark register, diary, inspection book, order book. Great care should be taken about entries made in class records, for these have to be transferred to the school records and in many cases the expenditure of public money such as the award of grants depends upon their accuracy and truthfulness. In all class registers, the pupil's name should be entered in the same invariable order. This prevents mistakes when marks, attendances, and percentages are transferred from class records. Detailed instructions for filling these records are given in the registers themselves. The marks should be entered punctually in the mark register. The entries should be dated and made to correspond with the dates in the scholars' note books. Marking once a week is quite sufficient. Small numbers should be used. Numbers are better than general remarks such as 'fair' 'moderate'. The *Headmaster's book* should be reserved for the comments of the headmaster on the teaching &c. of the master. The teacher should write nothing in it, but read and ponder everything in it well. The headmaster enters in it the date and hour of his visit, defects in teaching, discipline, class management, or a word of praise when advisable. The headmaster should also ascertain whether the teacher has benefited by the remarks made on him and his teaching on a former occasion. The *order book* is another useful institution for coordinating and directing the work of the staff. In this book should be entered all the notices sent round and the violaters of the rules, should be reported to the headmaster or punished by the class master himself.

It should also be part of the duties of the teacher to draw up reports of the progress of the pupil to be submitted periodically to the parents. The particulars which the parents might legitimately expect in the report are the following:—number of times pupil had been late or absent from lessons, results of examinations held during the term, number of scholars in the class to which he belongs, his standing in order of merit with regard to each subject of instruction, his place in the class as determined by the collective result of his work and his conduct. A duplicate of the report ought to be preserved. The mode of estimation may be either arithmetical by the use of figures or marks, or more generally by the use of such symbols as "Excellent", "Good" "Fair" "Moderate" and "Imperfect." All that is to be kept in mind is that the system of marking should reduce to

a minimum the chance of caprice and guesswork, and also that nothing should be recorded without preserving the data by which the record was arrived at. Moral qualities, it should be remembered, are not to be measured by arithmetical methods (See Fitch Lectures pp. 74-70).

Syllabus. The master should also keep a syllabus. He must prepare one for each subject at the beginning of the year, and then he should prepare a detailed one for each term. It is not only of importance as enabling him to overtake his work; but a sight of it would also spur the pupils on to better efforts. What the curriculum is to the school, that the syllabus is to the class. Having decided upon the subjects of study, each subject has to be arranged for the class. The questions have to be settled which study has to come before, how subjects have to be correlated, and how the topics within a subject have to be arranged. These form the problems of the syllabus. The syllabus should be drawn up as an organic whole. Not only one term or a year but the whole school course should be kept in view in drawing up the syllabus The syllabus in design should be a static unity, but in application should be a dynamic unity. It is here that correlation should be planned. The subjects should be disposed of in such a way as to suit the locality and the general requirements of the scholars whether rich or poor, urban or rural, advanced or backward. The syllabus too should be changed as often as new knowledge and new ways of handling such knowledge, make changes necessary.

A course of study must be divided into sections. Any one starting to teach a class for a term or a year should have before him a forecast of what he is going to teach, a plan in which the sequence of lessons is arranged, just as a man about to reach a destination should have an idea of his route. A few principles should be kept in mind 1. He must know the class's previous knowledge i.e., there should be a few classes for revising the old lessons. 2. The sections should as far as possible correlated with other lessons and lessons in other subjects. 3. Each group of lessons should be cencentred round one idea or group of related ideas ; but which at the same time should form a unit in an extensive scheme of study related in all its branches. Thus in English history. "The Misrule of Henry III", "The success and failure of Simon de Montfort," "The foundation of Modern England under Edward I". "The two Border countries : Wales conquered: Scotland unconquered." This would be a legitimate sequence; but not 1199—1216 John, 1216—1272 Henry III, 1276—1307 Edward I. 4. The order must be a psychological order. The adult mind can look backwards

and forwards. But the child can look only forwards and the sections must follow the sequence of ideas demanded by the nature of child mind and its powers of acquirement. 5. The time spent is a matter of indifference. No section should be left over and enough time should be spent upon the process of apperception. (Findlay. Principles p 283 ff; Collar and Crook: School Management. Chap III; Raymont: Principles pp. 216-18). Each class should also have a diary and a log book in which the teacher should enter the amount of work done every day. This would enable him to make steady progress and would facilitate supervision.

What the curriculum is to the school, what the syllabus is to the class, that the Notes of Lessons is to the daily work of the teacher. It indicates his preparation without which, as we have already said, no one can hope to be a successful teacher. If there is anything vague in his own mind, as regards the subject matter he is going to teach, the teacher's duty is to make it sure and vivid. Even if the lesson had been given once before, the necessity for preparation remains. The teacher who best interests his pupils, is he who is himself interested in the subject. If nothing new in material or method is found to vary the work, interest soon flags The oft repeated lesson is dry and lacking in power to interest. The fact that the teacher is about to repeat a lesson would take the edge off the lesson for the teacher, and would make it correspondingly dull for the pupils. There is a good psychological reason, why a lesson should not be repeated on identical lines. Even if it had been successful once, the two situations could not be exactly alike. Thus daily preparation is absolutely necessary and it often happens that young and enthusiastic teachers who are fresh to their work are more successful than experienced ones. The subject matter of the lesson is constantly changing. For one thing it is growing. The instruction again has to be suited to the varying needs and experiences of different groups of children. Therefore illustrations, readings, experiments etc. have to be changed. Therefore, "no two teachers will teach the same lesson in exactly the same way; indeed no teacher can ever repeat a lesson on identical lines". For the only true guide to method, when you are face to face with a class, is the pupil himself. If the teacher should suit the material of instruction to the mental content of the pupil, the lesson should change with changing groups.

Having made sure of his subject, gathered all his illus trations, gauged the previous experience and nature of the

child's life and gathered enough material to make the lesson vital, it is the function of the teacher to arrange it under definite headings. Some experienced teachers are able to carry their notes of lessons in their heads; but it is better to note them down. Notes for criticism lessons, differ from every day notes, in that though the latter have to be equally thorough, they need not include such things as the average age of the class and the amount of time. The special object of the lesson should be mentioned. Objects common to all lessons need not be mentioned (e. g. improving the mind) nor is there need to indicate the object implied in the title (e.g., a reading lesson is to teach reading). But such objects as "to train the reasoning power," "to educe conversation in a Modern Foreign Language" etc. should be entered. The apparatus to be used should be specifically mentioned. It should be ready, otherwise it is a source of disturbance to go for it during the class hour. The matter for instruction is arranged in two columns entitled respectively 'matter' and 'method'. The younger the pupils the more entries, should there be under 'method' and the less under 'matter'. Different lessons would call for different proportions between matter and method. In a writing lesson, matter will be little and method much. In history, matter will be much and method little. Many are not able to distinguish between what belongs to the matter column and what to the method. Matter column should contain only what the pupils should carry away with them. You should not write in matter column "Tell......etc.", as telling would belong to method. Set down the fact as such. A good lesson plan would contain pivotal questions propounding the problem and stimulating thought in certain definite directions. Some of these questions may be failures and may not achieve their objects, because, it is difficult to anticipate what is going to happen. But questions nevertheless should be prepared beforehand (see *Burnett*: Essentials pp, 80-82, *Strayer*: Brief Course Chap. XVI).

The various headings in the notes of lessons are preparation, presentation, recapitulation and blackboard summary. The object of the preparation is to recall previous knowledge, to evince the need for further knowledge, and to indicate aim and purpose Then the presentation gives the matter in logical order in the matter column, and how this is to be taught in the method column. Recapitulation should not merely be re-petition but revision of heads which would give a true perspective. In this step details, explanations, illustrations etc. are to be excluded. Blackboard work

should also be shown, both sketches and summaries. The summary should be clear and crisp and not worked on the spot but previously prepared. It should have been embodied in the notes. This summary should be obtained from the class by skiful questioning so that the pupils see the subject matter from a new view point.

The school should maintain certain records. I. The admission register. Each scholar's name should be entered in this register as soon as he is admitted. He must also be given a number which must be successive. When a scholar whose name, had been removed is re-admitted, a new entry must be made and a new number given. It should give his date of admission, name, address of parent and guardian, date of birth, last school attended, class to which admission is given, last attendance and cause of leaving (2) A school diary should be kept up. It must be a thick volume so as to be sufficient for a good number of years and it shouid be fastened with a Brahmah lock. Once a week at least entries should be made. Occurrences concerning the school, inspector's visits, visits of managers, change of staff, school events, introduction of a new method or plan, promotions, unusual circumstances that affect the school, should all be entered (3) The attendance register and fee registers (4) Register of summaries, summarising class attendances, promotions etc.

Staff Meetings. It is customary to call together (See Wren. Mackenzie p. 71 and Strayer chap xvi:) a meeting of the staff in a school. In some schools this is done once a week. This is an undue strain on the teachers. After a a full day's work it is not likely that they yearn after such meetings. Besides there is a practical difficulty in getting topics for discussion, if staff meetings are summoned too often. Once a month is ample enough. The meeting should be held at such times that it does not interfere with the scanty leisure of the staff or with the work of the school. It should not be held during the midday recess or during class hours when the classes will go unregarded. The meeting may be held during the last half hour of the week. This might be earmarked on the time-table itself or the games period might be utilised. Such meetings are useful in proportion to the amount of discussion of school matters they provoke. A staff meeting where the headmaster gets up and harangues and gives a great deal of theory borrowed from German and American books and where the first assistant gets up and seconds his views, while the teachers sit glum and silent, is

of no use. Every teacher should be entitled to bring in the inspection book, to read out the entries against his name and to offer any explanations, but no argument should be allowed. The headmaster should introduce praise or blame on the methods that were being followed. New methods might be discussed. Each teacher might be allowed to solve his doubts, and to obtain help to solve the problems he meets with in his daily work. This kind of meeting would promote growth. The best form of meeting would be, where teachers give criticism classes, in methods which they either originate or want to be adopted by others.

The seeond type of meeting is one, in which the headmaster finds it necessary to explain an order which he has issued and which has not been well understood by the staff; and so he might call the teachers together and explain it. Such meetings admit of no discussion. The headmaster explains and answers questions. The third type of meeting is a Teacher's Association or an association of teachers in a locality. Here lectures and discussions might be arranged. It prevents teachers getting into a groove, widens their outlook, and makes them see their schools through other people's eyes. It also promotes a corporate spirit. Such an association might publish a journal, conduct a co-operative credit society, organise conferences and take the place of a trade union. There is no doubt that the staff meeting in one form or another is a necessity in all schools.

The Class.

The class is the unit of instruction, though the individual is the unit in the school, since it is through the class that the individual is to be educated. A lecturer's duty is somewhat different from that of a teacher. He presents, expounds,. unfolds, interests; but it is none of his business to see, how far the information had gone home. With the teacher, on the other hand, Stow's maxim holds that "the teacher has not taught unless the child has learned." He must see that every one of his pupils learns what he teaches, and his progress is conditioned by the progress of the slowest member of his class. This rigorously limits the number in a class, by imposing on the teacher the necessity to attend to individuals. The size of a class depends **1**. upon the ability of the teacher, **2**. on the capacity of the scholars' receptive powers, **3**. the character of the subject,—the science lesson can be only for a. small class while a music lesson can take in a very large number,

4. when the practical method is used the class must be small. 5. Examination classes entail much correction work and so only a few can be taught in the highest classes, but many more can be instructed in lower classes, 5. backward classes can be instructed only in small batches. Large classes are not an unmixed evil. 1. The sympathy of numbers makes for friendly rivalry, moral strength andintellectual zest, 2. They develop individual reliance. The teacher is not able to do much and so the scholar must look after himself. 3. Certain classes of lessons such as appreciation, gallery and lantern lęssons, require audiences rather than classes. Thus ispirational lessons and lessons which appeal to the emotions require large classes. But such lessons have the most disastrous effect on the physique of the teachers, who are not said to last long. In spite of such facts we cannot gainsay the argument, that a class contains pupils of different tastes and aptitudes, and that class teaching offers to them all, the same uniform diet prepared in the same uniform manner (Wren pp. 28-29). This cannot but result in dulness. While the fact of the class is collectivism, the task of the teacher rests on individualism. Therefore classes should be limited in size and arrangements should be made for individual instruction.

Such considerations have led to the belief that the knell of class-teaching has been rung. The lady who tolled the bell is generally considered to be Madame Montessori. But we fear that this indicates unseemly haste. The funeral obsequies should have to wait. Class-teaching is not yet dead (See *Adams* : Mod. Dev. in Edi. Pce. Chap. 6.) Even in the Montessori system which is the extreme example of individual instruction, the class is retained as an organisation unit, and Madame Montessori has given the surprising figure of 45, as the number for which a Montessori directress can be held responsible. This would be considered a large enough number for any class. This means, that though the real unit of instruction is the individual, the class may be an organisation unit. The realisation of this truth had led to certain developments in modern educational practice. The extreme position which swears by individual instruction, has developed the Laboratory Plan more famous under the name of the Dalton Plan. Those who recognise the importance of individual instruction, but are yet unable to throw over-board the class system, seek for a solution in smaller classes where each boy would receive a legitimate amount of attention, in group instruction, in appointing study coaches, in homogeneous sectioning, in perfecting the teachnique of study, and in teaching pupils how to study.

The advantages of individual instruction are many. The teacher can study his pupil in great detail and find out what approach is best. The right kind of illustration can be supplied, whereas in a class he must be content with illustrations that will appeal to all. In individual instruction the exact line of error may be anticipated and the influence of personality is at its highest. Admitting all these, there are yet times, when the teacher will find the advantage of reintegrating the individual units. If a number of pupils are committing the same mistake, it is more easy to tell the whole class, instead of wasting time telling each pupil. Therefore group instruction is suggested as an alternative. This was unconsciously resorted to when examinations had to be passed. The teacher divided his classes into the sure passes, the doubtful or the borderline cases, and the probable failures. The clever boys got along as best they might, and the poor scholars received all attention. This was not altogether praiseworthy, since it hid bad work better than showed good work. The Jesuits used to divide their classes into pairs. This was a way of setting up rivals, who were to have an eye on each other, show up each other's faults and in this way stimulate each other to better ways. Mr. MacMunn, on the other hand, thinks that groups of more than two worked on a system of differential partnership. Such grouping increases the amount of independent work done by the pupil. In the ordinary teaching, the teacher is doing all the work while the pupil is passive. In the differential partnership, one boy catechises while the other answers and vice versa, First there is an integration of the class with demonstrations and general guidance, then a splitting into groups and finally reintegration for purposes of correction and recapitulation.

The teacher's responsibility is towards the individual pupil and even in the old class system, the good teachers always helped the pupil who fell behind the class, because he was a new comer or had been ill, or had come from another school system, by helping him after school or during recess or at any other time. This was regularised by the "Batavia system" where each class had two teachers, one to teach and the other to help pupils at their desks. This arrangement proved a blessing to the poorer scholars. Other systems appointed a coaching teacher who visited homes diagnosed pupil weaknesses and gave help.

those who stand near each other in the matter of mental and scholastic attainments, as judged by teachers, parents and school records. These sections are not water tight; but boys are freely moved among them as a result of frequent testing. Each section has differentiated assignments which are in three stages. All must do the first stage; those who do the next stage earn a higher rank, and those who achieve the third stage are ranked the highest. In this way, the course is enriched for those who are able, while all obtain the basic minimal requirements of the subject. Sectioning adds to the efficiency and pleasure of teaching, and is an effective means of adjusting school work to the pupil needs and abilities (Ruediger: *Teaching Procedures* Chap. 22).

One of the evils of the class system is that everything is done by the block system. The assignment is made for the next lesson, but nothing is said as to how it is to be learnt. "Come prepared with pp. 210-218", is usually the kind of assignment made and the pupil is to deal with the matter according to his lights. But now-a-days we are coming more and more to recognise that pupils should be taught 'how to study' or 'the art of study'. There is a certain difference between learning and studying. Some say that studying is the process, while learning thinks of the result. But the real difference is that while learning implies the correlative teaching and therefore the teacher, studying implies the absence of such a teacher. Self-education is the best education. He is the best doctor who makes his services superfluous to his patients. He is the best teacher who eliminates himself and teaches the pupil to get on without his services. This is done by teaching pupils the art of study or self-tuition (Read *Adams* : Mod Dev. Chap. 6, *Strayer*; Brief Course Chap. 8, *Strayer and Norsworthy*: How to teach Chap. 4.)

There are some general principles which underlie all study and which the teacher ought to make known to his pupils. 1. Study must have a purpose or an aim. The clearer and more definite the aim, the better the study will be. From the beginning, therefore, children should be taught to make sure what they are going to do before beginning to study. The assignment should never be so many pages, but a problem. If they cannot find the aim, they should consult others. 2. No proper study could be carried on without interest. The child should be made to realise that without interest study accomplishes very little. Certain devices such as making believe, working with another child, competing

with him, finding some connection with something in which he is interested, working against his own score and the like may be used. 3. Study involves concentrated attention and the results are better when such attention is bestowed. Children should be taught to concentrate, avoiding scattered attention. They should be taught to ignore distractions, to train themselves to keep their eyes on their work despite the opening of a door, or the searching for a book by a seat mate. Attention graphs may be made and shown to pupils. They should be taught to use a time-table at home also and to stick up to it. They should be taught that the best work is done when they are calm and steady. Excitement and worry are hindrances to study. They should be told therefore, to carry on their studies under favourable circumstances. They should be taught "such habits as beginning work promptly, acquiring an effective and economical rate of reading, developing the ability to secure at one time a general point of view, from a chapter, and at another time to analyse out carefully a chapter's contents, to maintain sustained attention and concentrated effort, to ask significant and pertinent questions", which lead to productive work in every subject of study (Thayer: *Op. Cit.* p. 169). 4. Study involves a critical attitude, a checking up of results against the problem set. This is the same thing as saying that a child should exercise self- criticism and examine his work by set standards. He must know it, when he has reached his goal or if he is proceeding in the proper manner. If he is memorising, he must be able to stop when he had got the passage by heart. He should compare his work with that of his classmates, with what other people think of it, and with what text books say. These are but general rules applicable to all forms of study. Where the special object of study is the formation of a habit, the memorising of a passage, or the appreciation of poetry, the special methods which are taught by psychology as the most economical in each case, should be revealed to students. For the rest, students should be taught the art of using reference books, which provides them with the technique of independent work. They should be taught to ask questions which bear directly on the point they wish to know. Children should be aware of the use of the question as a tool in study, because all study is merely the questioning of material. Children should be taught how to read books, to recognise major heads, illustrative points etc. They should be taught to use the table of contents, index and paragraph headings, to use sources and to discriminate among them (Read *Adams:* Student's Guide).

When we analyse the procedure we follow in studying, we discover that first of all, we try to discover what it is all about, and secondly, we proceed to scan the matter rapidly to get a bird's eye view. This preview is followed by noting the divisions and sub-divisions of the subject which, may later on be filled by detailed study and application. Instead of giving the same amount of attention to all parts—the easy and the difficult the important and the unimportant—attention may be distributed according to the needs of the case. It is here too that the differant types of study should be utilised whether it is habit formation, or memorising or appreciation or acquirement of skill. The last step is summary and organisation, in which we bring into convenient form the significant features of what we had studied. Such are the steps followed in effective study. It is the duty of the teacher to see that the pupils follow these methods. This has been achieved by supervised study.

In olden days the teacher set the lesson to be learned, the pupil learnt it at home and said it over in the school. No kind of attention was paid to the learning difficulties involved, and no help was given, except that by parents and relatives. Now the situation is reversed. The teacher assigns the lesson, suggests a method of attack, the pupil learns it at school and says it over at home. This change has been brought about, by carrying out some form of supervised study in the school. Supervised study means a shift from mass teaching to individual or group instruction. While in class teaching the prescription of the next day's work is carelessly made, in the supervised study plan, it is so made as to suggest a good start, to stimulate interest, with a clear statement of aim and suggestions as to the method of attack. The teacher becomes a director of study, watching and guiding its course into correct ways. The teacher is not merely concerned with the subject matter, but also with methods of study and so he works *with* the pupil rather than *for* him. The presentation of the subject matter is carefully organised from the point of view of the student. Supervised study means a longer school day, less home study and a different type of teacher. If pupils do much work at home, wrong habits of study are acquired ; if they study under supervision in the school for a year or two, they may be trusted to study at home by the proper methods. The supervising teacher should know how to put the pupil in the way. Therefore supervised study is a plan by which pupils could be helped and directed to use correct methods in study and thinking, regarded from the hygienic, economic and self-reliant points of view.

Various forms of supervised study are recognised. Firstly, there is the general assembly hall study period. Pupils assemble in the big hall during vacant periods and study under the supervision of a member of the staff or the librarian. This is not a satisfactory method because the number of pupils is too large, often one hundred. The teacher in charge could not be expected to be a master of every subject, and cannot be of help to more than a few; and cannot examine the methods pursued by each pupil. The second is the conference plan where a teacher is available for consultation by his pupils after a class lesson, or where the teacher calls up individual pupils for giving help in preparing a lesson. By this method, the teacher comes to know of the individual peculiarities of the pupils and their special difficulties and is able to give them the appropriate attention. The study coach and the unassigned teacher are also other means of securing individual attention for pupils. The divided period is also used to secure study supervision. A period of 60 minutes is divided into 3 parts:— 20 minutes for revision, 15 for assignment, and 25 for supervised study. So is the double period where, of two periods of 40 minutes duration, one is devoted to class teaching and the other to supervised study. Under these plans the weaker pupils are said to do very well.

Supervised study saves the time and energy of the pupils, imports definiteness into the work, aids discipline by keeping them always at work, gives them a working day, provides an atmosphere of study, makes for better understanding between teacher and pupil, diminishes home work in the early stages, allows time at home for recreation, teaches the pupils how to study and reduces the amount of passive absorption (Hall—Quest: *Supervised Study*).

The Dalton Plan.

Parkhurst: The Dalton Plan.
Evelyn Dewey: The Dalton Plan.
Lynch: The rise and Progress of the Dalton Plan.
Adams: Modern Developments Chap. 7.

The most radical method for providing individual attention is that known as the Dalton Laboratory Plan, so called from the high school in Dalton, Massachusetts, where it was first put into practice. The originator is Miss Helen Parkhurst. From 1915-1918, she took part in the application of the Montessori Method in California and it is believed that

the Dalton Plan is the logical outcome of the Montessori method. It has certainly some roots in the Montessori scheme: but generally speaking, it saw its birth owing to the universal desire to escape from the tyranny of the time-table and to give greater freedom to the pupil. The rigorous time card forces pupils to attend to subjects for which they may or may not be prepared. English begins at 10, Mathematics at 10-45, at 11-40 in walks the history master. The few who liked the lesson have to stop, the others who did not like the lesson and were already fatigued welcome the change. Those who where getting interested in the lesson have to wrench themselves off. Every class receives these shocks five times a day. Even though we might take the greatest care in classification, every class would contain pupils with varying preparation and abilities. The highest ten per cent in an ordinary class, can do from two to four times as much work, as the lowest ten per cent. The difference is even greater as between pupil and pupil. A is a clever student, has prepared his lessons at home and does not want much explanation from the teacher; B has been absent and wants to make up for the lessons he has lost; C is rather dull and requires to be helped at every stage. Class teaching deals with these various types in the same uniform manner, with the result that A's time is wasted, B is not interested and C thinks that the teacher is going at too rapid a rate. The system of class instruction is designed to suit all minds, and as the speed of a fleet is the speed of its slowest unit, the rate of acquisition on which the method of instruction is based is to suit the poorest scholar. When the pace is set by the average or "median" pupil, the poorest lag, feel perplexed and discouraged, while the ablest waste much time get into mischief, dawdle, and do not get the habit of working to capacity. There is a great deal of spoon feeding, and the pupils are made to use crutches whether they require them or not. It often happens that a class has a pupil, superior in calibre even to the master. Allowed the free run of the library and equipment, he assumes high flights. Tied to the poor intellect of the master, he has to crawl on the ground. In this respect class-teaching places a premium on dulness and a penalty on genius. When the school closes, the child is fatigued and he goes home and has to sit up doing home work, without help or guidance.

The Dalton Plan proposes to abolish these evils. Class-teaching is abolished to a large extent from the fourth grade upwards. The scholars are still grouped into grades; but the group does not go and sit at a master's feet The class

is retained only as an organisation unit. There are subject laboratories instead of the class rooms. The English laboratory would contain a number of dictionaries, reference books, literary books and pictures of writers. Boys of different grades who wish to read English would go to this room. The others would go to the history, the geography, the mathematics, or science laboratories as the case may be. Each laboratory is presided over by a specialist, but he does not actively interfere in the lesson. The duties of the teachers in the free hours are mainly five in number. 1. To preserve an atmosphere of study in the room. 2. To explain any detail in the assignment. 3. To give information in regard to the equipment. 4. To give suggestion as to the method of attacking particular problems. 5. To give full explanation of a point and its relation to the subject as a whole. Each pupil has a locker in his classroom in which he keeps his personal belongings. His group is under the special care of some one teacher and will meet in the laboratory for a short period each day, usually at the beginning of the morning. The teacher talks over class plans and problems, makes announcements and gives suggestions to help groups and individuals in planning their day's work. It is then that pupils get their assignment cards.

There is no time-table and no bell to summon from one room to another. The school hours are from 8-45 A. M. to 4 P. M, with a recess between 1 and 2 P. M From 8-45 to 12 is considered free time when the pupil can be working according to his will, in the subject laboratories. He takes five subjects—history, mathematics, geography, English literature, and some form of science. Each one of these has as many *contracts* as there are years in the school. The school year consists of ten months. Each subject is divided into ten *assignments* of one month each. The assignment is divided into four weekly parts, each called a *period*. Each period is divided into five portions, called a *unit* corresponding to each day of the week. The pupil should work at his contract subjects in the laboratories during the free periods from 8-45—12. From 12-30 are drill, assembly, mass movements and other school activities. The following half hour 12-30—1, is devoted to group conferences—one subject each day—in which the class meets its instructor. This is the class-meeting or conference. It is not like the ordinary class recitation, but the teacher presents things outside the pupil's experience, things impossible for him to discover with his limited time and equipment, and to guide reading and discussion of the subject by the pupils. The afternoon will be spent by the pupil for the work in art, for manual training

recreations, athletics and such other activities. The pupil should finish his assignment within the month, but he is at perfect liberty how he shall work it out—whether he shall take up each subject one after another and plough through it steadly, or take something of each every day. His progress is measured in his graph, of which there are four kinds. The first is the weekly graph which shows his weekly progress, the second is the monthly graph showing the monthly work; the third is the house graph and the fourth is the attendance graph. Before the boy leaves the room each day, he takes his graph card to the instructor and gets the amount of work done by him marked. Of course in such a system, the assignment has to be done with the greatest care. This itself is an advantage, as one of the real defects of the old teaching was that the assignment never disclosed a real problem. The pupils are free to take the advice of the master and to consult each other, but each one has ultimately to do the work himself, which is the real desideratum in all true education.

The advantages of the Dalton Plan are many. There is plenty of time to do all the work in. You are not called upon to do a great deal in 40 minutes and then to go to the next class and begin on another subject. You can go on doing, or stop when you feel tired. The child often loses the point of the instruction because he is not aware of the problem he is engaged upon. The Dalton Plan makes this problem vivid and living. The child gets personal and individual attention which removes one of the greatest defects in all class teaching. Each child is enabled to work at his own pace and speed according as interest prompts. There are no jerks and shocks. The brighter pupils have not to wait for the slower and the slow ones need not feel neglected. The plan promotes self-reliance, as the pupil discovers the information himself and assimilates it, instead of passively receiving it second hand. It is a good preparation for real life which is lived in groups and communities. The atmosphere of the laboratories makes for socialisation. Economy in equipment is promoted. In old schools there were only two or three sets of educational appliances and there was always a scramble for them. According to the Dalton Plan, with the three sets it would be possible to satisfy everyone. Similarly there is over equipment in the sense that a large number of books remain unused. The Dalton Plan will bring them all into full play. Finally children are trained in the art of study.

The defects of the plan are also obvious. It makes no provision for revision. Too much reliance should not be

placed on the graphs; for ultimately both teacher and taught come to think of them a great deal more than the work turned out. Self-reliance should certainly be taught, but in the Dalton Plan too much responsibility is thrown on immature shoulders. The pupil begins to worry about his work which is bad both for body and mind. In the world at large, we are not allowed to pick and choose, but are called upon to do the work that lies to our hand, whether we like it or not. Therefore the moral effect of being able to choose your work while young will be bad. It is said that the plan is a great boon to shirkers. This is not true. At the end of the day the work done has to be measured. If the work is not completed, the freedom of the pupil is curtailed and he is placed on the rigid time-table system. The master too keeps a good eye over his flock. In any case the shirker soon gets bored and returns to his work. There is a real danger that children may become overfond of the subjects in which they have an interest and may neglect the others. They may go to the teachers whom they like and avoid those who are not obliging. The plan requires that the text books shall be rewritten. The usual text book is written from the point of view of the subject and not of the learner. For the Dalton Plan they should be self-educative and not require the service of a teacher to expound them. An important failing of the system is that the inspirational and the thought provoking lessons are done away with. Finally, it increases the amount of exercise correction for the teachers. Slightly different from the Dalton Plan is the Winnetka Plan of Dr. Washburne who with Miss Parkhurst was associate of Dr. Burk, the originator of individual instruction. At Winnetka pupils are encouraged to go it absolutely alone without either class conference or group co-operation. Each subject has text-books of the self-educative type, which set up goals to be reached by the the pupils and passed, each goal leading to more and more advanced portions and the pupil measures his progress by self-administered tests. The Dalton Plan makes correlation possible, but at Winnetka each subject is learnt severely by itself. This leads to a mechanical method of budgeting time, for half the afternoon and half the mornings are devoted to social activities. Again Winnetka throws overboard the form idea since each boy can go as far into the subject as he could, without being handicapped by any consideration of the class to which he belongs. This has led to some analysis of the needs of adult life and so has made some contribution to curricula and by means of its self-teaching text books, looked at subjects from the point of view of study. But the plan provides for individual differences only in regard to rate of

learning and while standing out for mastery as opposed to partial learning, does not enrich the curriculum offerings or provide for what is learnt in school functioning in life, through group participation. (Thayer: op. cit. chaps. 13 & 14).

Somewhat slightly different from the Dalton Plan is the Howard Plan, so called from the John Howard School at Clapton, built on the site of the birth place of the reformer of jails. A god description of it is to be found in the book entitled *Towards Freedom* written by its originator Mrs. O'Brien Harris. Both systems are remarkably alike, in that they are attempts to apply Montessori principles to the higher classes. Both seek to provide individual work and freedom. But while the Dalton Plan retains the form system, the Howard Plan makes for a vertical division of the school into houses. It abandons the form system but divides each subject into 'stages', less in number than the terms available. First the three years' course, was divided into 'five stages' each stage being capable of being finished in one term. Thus out of the nine terms, four were freed. Each "stage" consists of both class lessons and 'card' lessons, the former are taught in the old fashioned manner by the mistress, the latter are left to be worked out by the student like the contract system of the Dalton Plan. To provide a certain amount of freedom of movement in the curriculum, each child belongs to a house. Each subject has a house allotted to it where the house mistress is the specialist. In the same house are to be found pupils of all ages and in different stages of progress. This house system makes for, *esprit de corps*, intimate relation between teacher and taught, and between older and younger girls. Finally each pupil takes a less number of subjects at any time than are required for the examination. The free periods are devoted to activities, aesthetic and useful. This system has many of the advantages of the Dalton Plan,

We shall view the Dalton Plan from the right perspective when we come to look upon class-teaching itself, as having been evolved, as an improvement upon individual teaching. In olden days, when education was not so widespread as now, schools were small and it was not possible to get pupils enough of equal standing to absorb the whole attention of one teacher. This resulted in pupils of different degrees of attainments, being jumbled together in one room under the teacher. The teacher sat at his or her desk and the pupils sat in benches round the room. They worked up sums, wrote copies, learned grammatical rules by heart and so forth, and they were called up individually to have their work examined and to receive help. There was thus no collective

of the sympathy of numbers. The instruction resolved itself into memory exercises: so much set and so much learnt. No doubt it taught habits of self-reliance, and the teaching was adjusted to individual needs. When class-teaching came, it was regarded as a remedy. Class teaching consisted in gathering together and addressing a large number of pupils who were of the same standing in the several subjects. Hence the grouping into classes, of children of equal attainments became a matter of importance. According as we judge by the attainments in all the subjects taken together, in each separate subject, or of groups of subjects, we have three different systems of classification. (See Thayer: *Op. Cit* Chaps 13&14,)

The Single or *Rigid* class system in which a boy is placed in the same class or form for all subjects. Each year a certain quantity of work has to be finished in each subject. On the basis of the work done in all the subjects during the year, promotions are made. The same group attends the classes in all, the subjects. There is no regrouping for particular subjects. This simplifies organisation and commends itself to all because in this manner we are able to give to the pupils a broadly based culture in necessary knowledge. The principle of correlation can also be satisfied. But according to this system, a boy may be called upon to work too long a time on a uncongenial subject, and to be marking time in another in which he has a natural aptitude, The remedy is to make promotions somewhat lenient. If a boy fails in one subject, but shows fair progress in most others he might be promoted. This is the Standard system followed in Germany. The single system favours the average pupil and produces boys of sound general attainments. The *Free* or *Manifold* system is the exact opposite of the Rigid. Each boy might attend a different class for a different subject. The advantage is that he will be suited in each case to the level of his attainments. In this system, the defect is that it is difficult to get a boy under suitable control; a defect which is remedied by the appointment of consulting masters, who are in charge of him throughout his school career. It also encourages specialisation at too early an age and it loses the advantages of correlation. The *Mixed* system, so called because it is a mixture of both systems. With respect to the form subjects, the single system is followed. Every pupil is placed in the same class in these and is promoted from form to form, year after year. In the case of certain other subjects—say Mathematics, Science and Modern Languages—the classification is different, pupils belonging to higher or lower classes than their form subject classes.

This system is good only for the upper forms and gives scope for individual bent. Classification is facilitated by the growth in the size of a school. In a big school, gradations become finer, easier and more effective. It becomes possible to run parallel divisions and thereby to get in each class, boys of an average to whom common instruction can be given.

It will be easily seen that the subject of classification is intimately connected with *Promotions*. The headmaster should be most careful as regards promotions. If undue kindness is shown from year to year and the unfit are promoted, he will find at last that in the highest class there are a large number of boys gathered together who are unable to pass the final examination. This is bad for the boy himself. He works hard and finds that he could not succeed. He is discouraged, he could not place his finger on the cause of his failure and so blames his class teacher. If undeserved promotions are made, the teacher soon discovers that about a fifth of his class is unsuited for the work on hand and is unable to fall in with the routine. The master cannot stop his pace to keep on with the laggards. This is why in the matter of admission and promotion the headmaster has to be very careful. Promotions are also more directly used to bring about a suitable classification and gradation. This is by means of terminal and half-yearly promotions. This is a controversial question. There are some reasons favouring half-yearly or terminal promotions. A clever child who has mastered the major part of the work of a clas in 4 or 6 months ought not to be compelled to repeat the work during the rest of the year. The child loses interest, the mainspring of attention and industry, and discontent and tedium result. Whereas, if he is promoted to the next higher class, he is soon able to overtake the work. The objections to term promotions are, interruption to a steady continuous year's work, the doubtful advantage of promoting a child into a class that has already completed about one half of the year's work, and the dislike of the class teacher to have the best of his pupils removed. The first is imaginary. The second can be obviated if the work is organised on a half-yearly basis and as regards the third, the teacher should subordinate his interest to that of his pupils. If bright boys are kept too long at the same work, their energies might find vent in mischief, or their growth may be arrested. If some bright boys are removed, other bright boys come up from below. The work may be rearranged to suit the half-yearly promotions. Commonly the whole work is finished in the first nine months and the rest three are devoted to revision. It would be better if the work is divided into two

parts in the rato of 5 : 2 or 2 : 1. The first part will be taken in the first half year, and in the second half-year the portion will be rapidly revised before taking up the second half of the year's work. This would put the pupil promoted after the first half year, in more or less the same position as the other boys in the class. A combination of yearly and half yearly promotions is the best. No weak child should be promoted thus; and such promotion should not be used to hurry a child through the school.

Much thought should be exercised before a scholar is retarded, because detention in a class has pernicious effects. All attempts should be made to promote children. Nothing is more deadening to the faculties and demoralising, as to keep a boy in the same form year after year. Interest vanishes, self respect and self-reliance diminish, and hope deferred maketh the heart sick. To such, terminal promotions should do immense benefit. There are three ways of dealing with such backward scholars. First, all attempts should be made to promote them. Boys who have been detained two and three years in a class, grow old, lose selfrespect, lack industry and are disposed to be troublesome. If promoted. they get among boys of their own age and their sense of responsibility may be aroused, especially is this true of those who have reached the fifth form, who should be promoted to the sixth. The device of the ungraded class may also be used to reform them. This is a special class for the backward in the whole school under a teacher who devotes special attention to each. In big schools it may be the C. division of a class. It is expensive, requiring an additional teacher and room, and casts a slur on those who belong to it. But it is efficacious as it uses special methods, devotes individual attention, and is after all only temporary. The third expedient is promotion on a one subject basis. The boy might have a gift in one direction, seize upon it, and promote him on that basis. This might awake a consciousness of power which would produce a salutary effect on his whole work.

Examinations.

Fitch : Lectures on Teaching VI.
Mackenzie : Instruction in Secondary Schools pp. 73 ff.
Raymont : Principles of Education p 266. ff.
Woodburne : Human Nature and Education chap 14.

The question of promotions broaches the subject of examinations. Here we speak not of the external or public examination; but of the internal examination as an aid to

education and as promoting the end of instruction. Examinations from this point of view, are but a somewhat more formal and searching mode of questioning than the one usually carried on in the class. These class examinations serve the threefold purpose of estimating progress, indicating defects and giving helpful hints for future guidance. The usual practice is to divide the year into two or three terms and to give an examination towards the close of each. Except the final one they serve the purpose of revision and the papers themselves should give the pupil a sense of the comparative value of different portions studied.

We should not be carried away by false metaphors into a wholesale condemnation of these class tests. Some say examinations are like digging up a plant by the roots to see if it is growing This is not true because we are not standing in the way of silent growth. To reproduce what is known is not to lose it from the memory, but to fix it. To leave a boy untested and unquestioned is simply to encourage stagnation and forgetfulness. Examinations are also said to encourage cram. If cram means dishonest, hasty and crude study making the pupil appear to know more than he actually does, we should condemn it in no stinting manner Cram appeals only to the temporary memory, and material acquired under examination conditions, evaporates as soon as this fear is removed. Such an education is wittily described as "what remains when we have forgotten what we have learnt", But cram is not encouraged by examination. On the other hand if the examiner knew his business, it should expose such ill-digested study. This defect can easily be remedied by changing the character of the questions asked. In certain subjects, like reading writing and arithmetic, cram is clearly not possible. Cram is commonly spoken of as work carried out with too great a consciousness of the imminence of the examination. Therefore to prevent such work, we should have surprise examinations. Examinations are said to lead to the idling away of ten months and a speeding up during the rest two months of the year. To be able to concentrate one's efforts in the two months, if it is not prejudicial to health, is certainly good, as in real life we are very often called upon for such exertions. Besides, the examinations can be spread out and distributed over the whole year. It is possible to prevent the abuse of examinations, if we have in mind the following. 1. The school should not prepare for more than one external examination. 2. The work should be spread over the whole year. 3. All the work should enter and be part of the daily routine. 4. It

would be good if there are fortnightly examinations conducted under examination conditions.

Two systems have been suggested : 1. Weekly examinations, one subject each week. In the end there should be an annual examination, not conducted by the class teachers. This leads to the pupil's concentrating all his attention only on the subject of the week's examination and to the neglect of every other subject and it leads to cram. 2 The second system is to have three terminal examinations, promotions being based on the average marks obtained in these examinations. This system encourages uniform work, Along with the terminal examinations there should be frequent class tests. The marks in these and his work in the class as shown by his exercise books etc., should also be taken into consideration for promotion. The first two terminal examinations might be set and marked by the class teacher, while the last is conducted and valued by other teachers The annual examination should cover the whole year's work and absence from it should not be pardoned. A boy fails 1. if he fails in English 2. if he fails badly in one subject. 3. if he fails in any two subjects. The paper should be prepared by the headmaster. He should himself supervise the examinations, correct some of the papers and award marks. It is his duty to see that the papers are reasonable, though keeping a high standard. He should return the answer books to the pupils after correction. The paper need not give choice of questions for a class examination. The question paper should gradually grow in the mind of the setter. If set all at once, it may result in one sidedness. The teacher should note down serviceable questions as he goes on teaching the subject. This would result in the papers being suited to the knowledge of the pupils.

The following are the marks of a good paper. 1. The language of the questions should be clear and unmistakeable without ambiguities, pitfalls and obscurity. 2. The questions should be fair, suited to the scholar's age and attainments. The paper is meant to draw out knowledge and not ignorance. Very often difficultquestions are set, which are meant to show off the teacher's knowledge, and to impress others about the high standard of teaching obtaining in the school 3. A good proportion of the questions should be knowledge tests, on matters of fact and of memory, plain straight forward questions in a familiar form, of a type which the average hard working pupil can answer 4. There should also be a few thought-provoking questions or capacity

tests, so that the more intelligent children could distinguish themselves. 5. Every paper should have an educational value, over and above its nature as a test. It should give the pupils some notion of the ideal you are aiming at, by reference to which they may prepare their lessons. 6. The questions should not call for vague answers and speculative knowledge. This they do when they are large and comprehensive. For example "who were the Greeks, and what was their influence on the intellectual development of humanity?" is a comprehensive question, about which anything can be written.

Some precepts may be had in mind in valuing papers. Give 100 marks, to the paper as a whole. Of these, distribute 90 among the questions each according to its difficulty but retain **10** for neatness, finish, style etc. The intelligent questions might be marked high; but it is not advisable to give the rank of each question on the paper itself. Each answer should be assigned its value and the paper should not be marked as a whole. If a pupil answers four questions out of six, and gets full marks for them but less than if he had answered all six, add some more for general ability. To fix the standard in your mind, read several papers before beginning to mark. Mere absence of knowledge should not be punished by negative marks, as this would deprive marks obtained fairly for other questions. But a pretentious style, bad spelling and guessing, might be punished by negative marks.

Teachers should be in a position to give advice to students about to appear for examinations, which would enable them to make the most of their knowledge (Read Adams: *Student's Guide* chap. 10.) The following would serve the purpose. 1. Pupils should be made to find out everything about the examination such as the minimum to be scored and the several subjects which go to form the separate minima. **2**. They should find the requirements of the examination by means of the printed syllabus. **3**. Questions set on previous years are like a syllabus read backwards. Pupils should be made to answer these questions under examination conditions. 4. Answers for "stock" questions might be prepared and studied. **5**. Those who are about to appear for examinations may be given the following advice. *a*. They should go to the examination with a well-rested brain. *b*. They should think and secure every thing that they need to take to the hall, the previous evening. *c*. They should see both sides of the question

paper lest they leave out questions printed on the other side *d*. Each quetsion should be allotted a fixed portion of the time. *e*. When there is a choice of questions, the easiest should be chosen. The notion that the difficult questions fetch the higher mark is false. *f*. Every question has a definite point which the candidate should seize and grapple with. This is what is meant by answering to the point. *g*. Guessing should be avoided. *h*. Full advantage should be taken of any incidental information supplied by the paper itself. *i*. Answers should be read and revised before being handed over.

Achievement Testing.

Ruch. The Improvement of the Written Examination.
Ballard. P. B: The New Examiner.
Ruch and Stoddard: Tests and Measurements in High School Instruction.
McCall W: How to Measure in Education.
Tiegs E. W. Tests and Measurements for Teachers.
Greene and Jorgensen: The use and Interpretation of Educational Tests.
Paterson: Preparation and use of New Type Examination.

Examinations have come to dominate social life in modern times, and the essay has come to dominate examinations. Until now the effect of examination on syllabi and teaching have been inquired into, but not its own ability to carry out its avowed objects. With the popularity of mental testing, the validity of the essay type of examinations has been widely questioned and is leading to the newer objective examination. Three functions are generally attributed to examinations. First, the examination is designed to give *motivation*. Pupils tend to accomplish more when they know, a day of reckoning is at hand. Such motivation is likely to be at a minimum in the traditional examination which is open to bluffing, evasions and the writing of mere words; and at a maximum where as in objective tests, the definiteness and the searching nature of the knowledge required are greatest. Secondly, the essay type of examination is believed to give training in literary expression, in the organization of thought and in reasoning. The New Type examinations do not serve these purposes at all. But should they? "One thing at a time" is a good motto in education, When we are testing the factual command of the pupil, let us confine ourselves to this task. The old type written examination claims to examine the

power of linguistic expression as well, and this it does in a poor kind of way. In the hurry and bustle of having to answer about six questions in the space of three hours, the chief interest of the pupil is to get down all the facts as quickly as possible and so literary expression suffers and slipshod language is encouraged. Dr. Ballard draws attention to the difference in merit, of two essays of a brilliant young girl on the same subject, one written under the pressure of the examination room and another at her own pleasure and leisure.

The third function of examinations is measurement, and it is here that the traditional essay type of examination is mostly at fault. Its weakness is due to the limited and coarse *sampling* and to the *subjectivity* of the scoring. All examinations are limited in their sampling, but the essay type with its five or six questions is more limited than the new type with its one hundred and more. The selection of topics for questioning varies with different teachers and with the same teacher at different times. The responses of the examinee will differ with different samplings and it will be hard to tell as a result of the examination what he knows and what he does not know. The longer the paper the more reliable the result. Otherwise 85% means 85 % of 5 or 20% of the subject matter. In the essay type a candidate who has misunderstood a question or had been absent at the time when its answer was taught, is penalised to a greater degree than in the new type examination.

Though the essay product of the pupil varies from week to week and month to month, the judgment of the teacher once made, always remains the same. This has been discovered and made plain by an American experiment, where the successive essays of the same pupils were measured up aginst a standard scale and were found to vary in merit as much as six mental years, that is to say the essays may have been written by a lad anywhere between 12 and 18. The teacher, however, has a preconception of the merit of a particular student and this prejudgment colours the evaluation of the particular specimen of essay before him. This is common in all literary judgments. No literary product is really anonymous. We expect satire of Shaw and charm and tenderness from Barrie, so that whatever comes of their pen, is credited with these qualities. Even a professor's answer, if it bears the name of a pupil, stands in danger of failing. In a certain American university, a history paper was being marked by a board of examiners, one of whom

was very conscientious and wrote out a model answer himself to serve as guide. By mistake, this paper got mixed with the rest of the students' papers and was valued by the other examiners, who awarded it marks ranging all the way from 40 to 80 in a scale of 100, the failing line being 60. So the professor failed in his own examination, as his answer masqueraded under the guise of a student's.

Neither is bias the only reason why an objective judgment is impossible. Many of the assumptions of the old type examinations are unwarranted. To judge a person's capacity by his answers to a particular question at a particular time, must needs be liable to error. A certain number of marks is assigned to each question and the value of the candidate's performance is the sum of marks obtained by him on the whole. The assumptions here are that we have a reasonable basis for deciding the value of each question, and that a number of examiners will agree in evaluating the performance of the pupil by reference to this standard. These assumptions have certainly not been borne out in the case of men who have often been proved to be better or worse than their marks. The evil has been remedied by a *viva voce* which again is a highly subjective examination. The assessment of such a complex product as an essay has to note very many qualities e. g. clearness of exposition, accuracy of factual statements, pertinence of argument, extent of knowledge, logical development. These the examiner should arrange, in his own mind in relation to their value in achieving the purpose or aim of the examination. Thus both in his conception of the aim of the examination, and in his assignment of values to the different qualities of the candidate's answers, there is wide scope for subjective differences to show themselves. If the examination is for selecting bank clerks, accuracy in arithmetic may be a surer index of suitability, than ability in problem solving, which will indicate suitability for a scholarship in an institution of higher learning. One examiner may be much more influenced than another by a candidate's power of composition, another by his accuracy in detail, still another by his total grasp of the subject. Examiners may also, differ in their competence which again produces disparity in judgment. When the examination is one of quality, subjective judgments could not be avoided. In judging handwriting different examiners will come to different conclusions according as they rate the three component parts of legibility, speed and form. The written examination breaks down completely in evaluating culture which according to Whitehead is "activity of thought, and receptivity to beauty and

humane feeling''. Where the aim is definite, as in the technical tests, the result is not so unreliable as in the "general examination''. The attempt to evade piecemeal marking by awarding total impression marks such as *a*, *b*, *c*, *d*, (+or—) breaks down because it cannot arrange condidates in an order of merit.

Experimental evidence for the fallibility of the essay type of examination is abundant. The earlier experiments on the variability of grades distribution in some of the American universities, have been summarised by Starch (*Educational Psychology* chap. 22.) Meyer showed by referring to the markings of 40 teachers during 5 years in the university of Missouri that A grades varied all the way from 55 % to 1 % of the students, B, 61 to 11, C, 60 to 6 and F, 28 to 0. Starch and Elliott proceeded to measure experimentally the difference in the values assigned by different examiners to the same piece of work. Two final examination papers in high school English were graded by 142 teachers in as many high schools. One geometry paper was similarly graded by 118 teachers of mathematics, and one American history paper by 70 teachers of history. The variations in marking were astounding. The marks of the first English paper ran all the way from 64 to 98, of the geometry paper, from 28 to 29, and of the history paper, from 43 to 90. Two conclusions were drawn from this experiment. (1) that teachers' valutions of the same piece of work vary enormously (2,) that they differ as much in one subject as in another, in mathematics as much as in any other.

Starch arrives at four causes for such variations (1) differences in standards of severity or leniency of the different schools (2) differences in the standard of severity or leniency of the different teachers (3) differences in the credit or penalty assigned by different teachers to any given fact or error (4) minuteness of the discrimination between successive steps of merit of quality in a given scale. In regard to the first, Miles made investigations which have proved that standards vary widely from school to school. He made comparisons of the grades made by elementary school pupils with what they made later in high schools. Since all subjects were included, the subjectivity of teachers was ironed out. He found that the correlation between high school marks and elementary school marks was 7.1, which meant that if high school success were predicted from elementary school marks there will be large errors. Kelley came to the conclusion that as between school and school the disparity was so great, that a mark of 70 in one school may mean a mark of 81 in another.

The second cause of variation is that each teacher has his own standard of values. Kelley proves with reference to the distribution of grades in a Chicago high school, that the percentages of A. B. C. D. F. awarded in the different subjects vary widely. English teachers fail three times as many as do Domestic Science teachers and give but half as many A's. A pupil's chance of getting an A in German, is approximately twice as great as his getting one in French. Ruch obtained 3 answers to a question in geography one of the very best, one from a median paper and the other from among the poorest paper. They were mimeographed and sent to ,91 teachers to be regraded. The regrading proved that the best answer received on the average 4 points more than was awarded by the first grader and the poorest 5 points less. The explanation is that assuming that the average judgment of a large number of examiners to be nearer the truth, the well-known tendency of an examiner to value a superior paper too strictly and a poor paper too leniently has been brought into play. This is why veteran examinees of the Madras University prefer to sit in a "rotten centre" so that their papers might shine by comparison and avail themselves of the leniency of an examiner, forced to value a large number of very inferior papers.

Ballard has shown similar variability among examiners. He selected seven essays of differing merits and submitted them to 13 examiners. The essays had been marked by an independent examiner who had awarded them marks ranging from 40 to 90 in a scale of 100. The new examiners were asked to arrange the papers in order of merit. The result showed that one paper occupied all the seven possible positions, two six positions each, and each of the remaining four, occupied five positions. These experiments prove that "the sources of unreliability in our present essay-type of written examination are to be found in the fallibility of human judgments". In the experiments of Starch this was the fourth reason for variability. He made examiners regrade papers which they had graded once before and discovered that the mean difference between the first and second grading was 2.2 points.

A more complicated experiment was made by Ruch who took 16 eighth grade examinations given in ten different states to 972 pupils. Each pupil wrote a paper in 1923 and in 1924 and each paper was marked by two examiners. Six correlations were possible and each was revealing as to the reliability of the old type examination. The six correlations

were resolved into three situations in the first of which the examination was constant but the examiner was variable. The correlation between the two situations was ·62 with a prediction value of only 22% better than chance which meant the possibility of success or failure depended on who valued the paper. In the second situation the examiner was the constant and the examination was the variable. The correlation here was ·43 with a prediction value of 10% better than chance, thereby showing that a candidate's success or failure depended on which year he appeared. In the third situation both examination and examiner varied as is usually the case and the correlation was ·38 with a prediction value of 8% better than chance.

So variable has been the appraisal of school room products that many have questioned the possibility of introducing exact measurements into education. They say that quantitative measurements could not be made of the education process, which deals with spiritual values and is essentially qualitative in character. "Education deals with the things of the mind with impalpable, imponderable things such as tendencies, interests and aspirations, things that have no more to do with the measuring tape and foot-rule than has the fragrance of a rose or the beauty of a star". (Ballard: *Op. Cit.* p. 36) It is well therefore if we analyse the essentials of measurement to see, if there is anything in its nature opposed to the facts of the educational situation. The three essentials of measurement are that it deals with magnitudes, that the thing measured is always an abstraction, and that it uses an objective scale. There are two kinds of magnitudes extensive magnitudes and intensive magnitudes. Of extensive magnitudes it is possible to say that the whole is equal to the sum of its parts, that it should be measured in terms of its own kind, that it could be added to and subtracted from. For example seven miles are more than three miles by four miles. This could not be said of intensive magnitudes. A note of particular loudness is not made up of other notes of different loudness. Therefore, the sum or the difference of two intensive magnitudes could not be expressed in its own kind but by something else. Thus if five parts of water at 20° C are added together the resulting mixture will not be boiling, but will only be 20°C. This is why we have scales. The temperature of boiling water does not differ from that of freezing water by some other temperature but by certain degrees in the thermometric scale (cf. Hamilton *The Art of Interrogation*, p. 61). Intensive magnitudes

is different from its loudness, the one depending upon the amplitude of the vibrations, the other on their rapidity. In this manner there are two categories—quantities which could be measured in their own kind and qualities which can be measured only through a scale. The progress of science is a progress in quantitative measurements and items are increasingly being transferred from qualitative to the quantitative basis. The thermometer was invented only during the reign of James I. Before that time judgments in regard to temperature were purely subjective, one man's heat being another man's cold. "Everything that exists exists in some quantity and therefore could be measured" says Thorndike. The only question is the perfecting of the yard stick Therefore education whatever its character, waits merely for the proper measuring rod being perfected, before being rendered amenable to measurement.

The next characteristic of measurement is abstraction. We measure a thing not in its totality, but in any one of its various properties. There is no single measure for the length, breadth, volume and cost of a box. There is only a measure for each. This is known as the principle of the single variable (Hamilton: *Op. Cit.* p. 61). The capacity of a cistern depends upon three things—length, breadth and depth, but the capacity is a single measure. In the same way there is a measure for spelling ability, for accuracy in arithmetic, for reading ability etc. but their total cannot, be taken to represent the pupil's ability in each, except in so far as it is the expression of a common factor. Therefore, pupils could be compared with one another in their specific scores, and not on their general score. A test must measure the same thing in all cases. This is what our examinations fail to do.

The third character of measurement is *objectivity*. In knowledge there is something which belongs to the subject which knows, and something that belongs to the object that is known, something that is internal something external; something private and personal, something common and universal; in short something subjective and something objective. Our perceptions are usually coloured by our own feelings. In mathematical language, this is spoken of as the personal equation and has to be allowed for in calculations. When we are measuring different quantities of the same thing, the objectivity of the process is great. But when we have to measure up one quality against another, we evaluate using units of value. The objectivity of such a process is at a minimum and its subjectivity at a maximum. We may be able

to measure different amounts of spelling ability; but when we compare spelling ability with accuracy in arithmetic, we have no outside scale to refer to, each has to be judged on its own merits. Thus to a typist spelling ability may appear more valuable than arithmetical accuracy, which may appeal to a bank clerk. Each has his own scale of values. The evolution of objective scales in such matters is beset with difficulties which are, however, not insuperable. Objectivity is not the property of material objects alone but also of relations, laws, principles, universal truths and ideas. Sciences which deal with such conceptions have objectivity. In the domain of morals and art subjectivity plays a larger part. With all that there are universal principles both in art and morals, had we skill to find them out and find them out we shall, in course of time. If we ask little children to draw a five pronged fork, the number of prongs drawn will be variable, but with increasing age the number will correspond with the actuality. This does not mean that the prongs lack objectivity but only that the children do not sense it. Similarly we may hope to have scales in matters where we don't have any now. At present educational judgments are not free of subjective defects but the time is already come when they have begun to assume objectivity.

The Criteria of a good Examination.

The first criterion of a good examination is *validity*, by which is meant the degree to which a test or examination measures that which it purports to measure. Supposing the object of the L. T. examination is to measure knowledge of the Theory and Practice of Education, too many questions should not be set for the six hours. Otherwise the examination will degenerate into one on speed in handwriting. Therefore all tests have to be validated first by the consensus of judgment of competent persons, and next by correlation with an outside criterion. In the second case, the test results for instance, should agree with intelligence ratings, teachers' marks, etc. The third type of validation is by taking into account, the percentages of pupils who answer each item correctly at successive age levels. The more a test is successfully answered by all, the less discriminating value it has. Such test items are "dead timber" and should be weeded out. A good test item shows steady increase in the number of puplis passing it, as we ascend the age or grade scale. Statistically speaking, the more the distribution of marks in a test item accords with the probability curve the more valid it is. The fourth means of validation is agreement with life situations. Thus tests in spelling ability, vocabulary, arith-

metic, should demonstrate their usefulness in life. For spelling and vocabulary, such words alone should be chosen as are of frequent occurrence in life. This is responsible for word counts like Dr. Thorndike's "Teachers' word book". The more nearly a test situation parallels a life situation, the more valid it is. It should in fact, be a smaller sampling of a larger life situation. A fifth principle of validation is by harmonising with curricula, text books, courses of studies, minimum essentials etc. That is, the subject matter of examinations should be carefully analysed and studied and the questions should sample widely among essentials.

The second criterion of a good examination is *reliability* by which is meant the steadiness with which a test measures that which it measures. It is the *accuracy* of a test. It is the self correlation of a test *ie.* the degree to which two administrations of the same test or equivalent tests, *Coeteris paribus*, correlates in respect of the numerical results. Such self correlation is usually expressed in a *reliability coefficient* and is stated along with it in the case of every respectable test. It is found by taking a large number of test items say 200 and dividing them by lot into two groups of a hundred each. One group may be administered to a class on a certain day and the other on the following day. The results are then tabulated and the correlation between the two series of marks determined. A reliability coefficient of 0·95 to 0·99 is very high and is rarely found among present day tests 0.90 to 0.94 is high and so is found only in the case of certain of the best tests; 0.80 to 0.89 is fairly high, and is adequate for individual measurement; 0.60 to 0.79 is rather low but it may do for group measurements; below 0.70 is too low for ordinary purposes, but it may serve survey purposes.

It is in its reliability that the new type examination is superior to the old essay. The factors which determine unreliabilty are (1) subjectivity (2) brevity (3) coarse units (4) nature of the function under measurement and (5) actual variations of the pupils under measurement. In every one of these five respects, the essay type is inferior to the new type objective examinations. For example, the essay type has only about 5 questions which makes for brevity and coarse sampling. We shall see how this factor determines unreliability. In a spelling test of 20 words, the reliability coefficient is 0.40 while in 100 words of the same type and difficulty it is 0.77, (See Greene and Jorgensen· *Op: Cit.* p. 57) So the longer the test and the greater the number of items included, the more reliable is the test result. Reliabi-

lity is dependent upon the objectivity of the scoring, and is decreased by faulty techniques in questioning such as catch questions, poor wording, ambiguity etc and by non-discriminating items.

The next criterion of a good examination is *objectivity* by which is meant the degree to which the personal element or judgment is eliminated in the scoring of the answers. One of the main points of superiority of standardised tests over traditional examinations, is the elimination of the unavoidable errors of judgment as to the merits of the answers. The superiority of the new type examination in objectivity over the traditional examination, is easily demonstrated. Greene and Jorgensen (*op. cit*, pp 79—80) speak of an examination on the same subject matter given to the same pupils, but in two different types—the essay type and the new type. The essay type had ten questions, and the new type 40 true false items. Both types were valued by a group of ten teachers. The average on the essay type was 83 marks with a mean, deviation from the average of 3. The average on the true-false test was 31, with a mean deviation of ·2 only. Only one person attained the average in the essay type, while only two out of the ten deviated from the average in the true-false test.

Teacher	Essay-Type 10 qns.	True-False 40 items.	Average for essay	Average for True-False
A	84	31		
B	80	32		
C	88	31		
D	76	30	83	31
E	82	31	average	average
F	90	31	Deviation	Deviation
G	85	31	3	·2
H	82	31		
I	83	31		
J	80	31		

(Table after Greene and Jorgensen)

Objectivity may be expressed statistically in terms of the degree of correspondence between scores or marks assigned to different papers by the same individuals at different times. Objectivity is a matter of the mere mechanical construction

of the test, several standard tests have, therefore, adopted mechanical features of scoring, such as the use of transparent celluloid, perforated sheets, or printed strips which can be superimposed on the pupils' answer books, thus facilitating comparison with the stencilled correct answers. Again, the amount of writing which a pupil has to do, has been cut down and he is only to underline, check, cross out or otherwise indicate the correct answers.

The next criterion of a good examination is ease in administration i. e., ease in setting, scoring, answering and interpreting the examination. Money and time should be economised. The new type questions consume more time to construct but once made, they last a number of years. They also consume money because the question papers are voluminous; but they are time-saving in the correction.

We have now seen the short comings of the traditional essay-type of examination We have also seen that there is nothing in the educative process which is opposed to exact measurement. We have just now seen the criteria which such measurement should conform to. Attempts have already been made to rectify the weaknesses of the oldtime examinations and to make measurement in education more and more exact. This has resulted in the New-Type objective examinations which when used without norms and standards are known as informal; when so used, they are spoken of as standardised tests; and in either form they are used to measure achievement in the school. Such achievements could also be measured against standardised scales, in which case the various items are arranged in order of difficulty. Three important milestones stand on the road, from the old to the new :—Dr. Rice's application of scientific measurement to school attainments in 1897, the issuing of Binet's intelligence scale in 1908 and, the setting of intelligence examination to the American army. "If Dr. Rice is to be called the inventor of educational measurements, Prof. Thorndike should be called the father of the movement". (Ayres), Utilising the Cattell—Fullarton "equal distance theorem" he devised a scale unit for the measurement of educational achievement. This is the beginning of scientific educational measurement. Thorndike gave a course on the subject in Teacher's College in 1902 (Kandel) and his "Introduction to the theory of mental and social measurements" appeared in 1904. Stone's arithmetic tests were worked out under his direction in 1909. Subsequent students of Thorndike have elaborated the statistical techniques and constructed tests in different subjects. The movement thus

started has gone forward into every country and we may confidently predict that achievement tests have come to stay (McCall. *op. cit.* pp. 14—15).

Objective Tests

There are at least *thirty-five* types of objective questions possible. But usually, only seven or eight forms alone are employed. They fall into two main classes—the Recall and Recognition types. There are two forms of the recall type—the simple recall and the completion exercise. The simple recall consists of questions which have a single word or expression as the only correct answer. Hence it is also called the one-word-answer recall. It consists in the reversal of the usual form of question. Instead of asking "what is the barometer?" we ask "what is the name of the device used to measure air pressure?" Examples of simple recall type:—(1) The first man to reach the North Pole was— (2) The structural unit of the nervous system is the—(7) in which example the number 7 is the number of letters in the answer "neurone." A corresponding number of dots may be used for this purpose as in (3) The part of the brain in charge of physical movements is the. ....(cerebellum) These devices are to enable the candidate to check the correctness of his answer and to discourage him from guessing. It circumscribes the possible responses and makes the scoring mechanical and objective.

The one word recall type is good in testing definite knowledge such as dates, events, authors, characters, and so is more serviceable for the testing of information and memory, rather than the application of principles, the making of comparisons and the giving of reasons, though these are not impossible. In framing this type of question, it is better to have in mind the old type question and write out a concise answer to it, and to leave out the most important or key word in the answer to be supplied by the pupil. It is a good way of testing the pupil's thoroughness of learning and the degree to which he has organised the theoretical and factual materials. It is difficult to coach up for it, and the rote memory could not be depended upon to answer it. The form of the question compels the pupil to be brief, concise, definite and specific in thinking out and phrasing his answers, and makes understanding more important than vague ideas, general impressions and empty generalities. Brevity in question and answer, enables a large number of items being pressed into a small space of

time and therefore it allows of ample sampling and ease in scoring. The disadvantages are the labour required in writing out the questions, the temptation to select non-essentials, and the absence of comprehensiveness where only one fact in an involved process could be tested.

The completion type is one of the most commonly used in New-Type examinations. It consists in the preparation of a statement with certain words omitted, the requirement being to supply the missing word Examples :—

"Bantling discovered. ......(insulin)(7)
"A revived percept is an ····· (image) (5)

This type of question could be used to test knowledge of a very complicated process by leaving out key words in the description. Too many blanks, however, will make it puzzling.

In the Recognition type of question the answer is suggested through alternative choice. Several forms of it are available 1. Multiple response, 2 True—False 3. Matching exercises, 4. Best answer 5. Identification, 6. Rearrangement. 1. The Multiple response question makes a statement together with several, usually four or five, alternative answers only one of which is correct e. g. "The most important product of Chile is 1. gold 2 nitrates 3. cattle 4. wheat underline the best response or indicate its number," The assumption here is that the pupil who has the requisite knowledge would select the correct answer without hesitation. To the pupil who is ignorant, all answers would appear equally plausible. The chance of guessing is curtailed by increasing the number of the alternatesand their plausibility. If 4 alternates are given the chances of guessing the correct answer are 25%; if 5 only 20%. Partially correct alternates should not be used since they lead to argument and thereby destroy the validity of the questions. The multiple response is the most rapidly scored test and is easier to prepare than the completion question, but often it is difficult to get more than two or three plausible alternatives. Some require one answer only; others the best choice among several possible answers and still others may have more than one correct answer.

2. The True-False form consists of a statement which the pupil is to judge true or false or to say "yes" or "no" to A newer type is being introduced which would

automatically eliminate the chance factor. This is the double or, paired true false exercise. For every item of fact there is a true and a false form of the question, both counting for one score and the two do not come near one another. Examples: –

1. The slow learner retains what he gets better than the quick learner . True-false.

2. White blood corpuscles are more numerous than red yes-no,

3. Does admiration always involve flattery? . yes-no.

4. May flattery be an expression of admiration? yes-no,

The pupil is to underline or to enclose the correct answer. Because of their wide applicability, easy administrability and scoring, the true-false exercises are the most popular among the new-type examination forms. They are the most rapidly answered. Of the recall type 4 to 8 items could be answered in one minute, of the recognition type 6 to 10 items, of the true-false type 10 to 15 items. But there are some limitations in that all pieces of information could not be expressed in true-false forms, and even what could be so expressed is liable to ambiguity and to be guessed.

3 .Matching exercises are particularly useful in teaching certain kinds of knowledge such as dates and events, authors and their works, statesmen and acts of state, men and their descriptions, things and their definitions and so they are very useful in history. Examples :—

Discovery of America	1832
Battle of Plassey	1492
First Reform Bill	1757

The pupil has to match the event with the appropriate date: This exercise is quite objective but if a few examples are used guessing enters and if larger numbers are used, there is some waste of time

4, The best answer type is a variant of multiple response but allows long statements to be made, which however are troublesome to print and waste paper. If a few are chosen chance enters. Examples:—

The chief function of the blood corpuscles is the

........Destruction of the disease germs in the blood.

........Carrying of Oxygen to the tissues.

........Carrying of food materials to the tissues.

5. The identification exercise takes too much space and 6. The rearrangement exercise is akin to matching.

Paterson gives a number of instructions for the preparation and use of new type examinations which are worth following. First of all decide on the scope of the examination, make a list of the topics that fall within it, and the most significant facts in each topic, and then make out the questions taking care to cover every phase of the subject. Prepare from 50 to 100 per cent more questions than are needed, and arrange them in order of importance, so that the least desirable may be left out. Don't make the questions too difficult, for if so, they will be non-discriminating. Let there be some difficult ones, some moderately difficult, and others fairly easy. Let the easy ones come first, so that the pupil may enter into the answering with cheerfulness, the moderately difficult questions may follow and the most difficult ones may come last of all. Questions should be brief and free from ambiguity. They should not depend one upon the other for answer. There should be a large number of questions, if the examination should be reliable. A true false test must have at least 100 items and the recall type may require more than 50. An examination should have various types to prevent monotony, and there should be as many parts as there are types. Generally speaking, a paper of 100 items should include 20 recall, 20 true-false, 20 multiple-response and 40 matching. Within each division the questions should be arranged in the logical sequence of the subject matter. There should be directions as regards the examination as a whole, and as regards each one of its parts. The true-false items should be arranged in a random order, the question of the sequence of the true or false being determined by lot. There should be an equal number of true and false items. Similarly the position to be occupied by the correct answer in the multiple choice should be determined by chance. All these cautions are to make guessing impossible. The questions should be printed or cyclostyled. If dictated, pupils develop signalling systems especially in regard to true-false and multiple-choice. No superfluous paper should be given out, and the answer papers should not be returned, if coaching in successive years is to be guarded against.

The problem of guessing is a real problem in the new type examination and several precautions are taken to obviate it. Some advocate the instruction to guess. Pupils have different degrees of assurance about a correct answer. Some answers they know for certain, about others they have partial knowledge and reasonable assurance; about still others they have a kind of residual knowledge which prompts and substantiates guessing. Finally there are some questions the answers to which they do not know. If

instructed not to guess, the pupil does not get credit for partial knowledge. On the other hand, if he is asked to guess when he is not sure, he may have a contempt for the whole examination as a cross-word puzzle, and pure guess-work. The problem of guessing has two aspects (1) how far is validity affected by correcting for chance (2) whether pupils should be instructed to omit doubtful items or to attempt everything.

(1) It is the common practice to make statistical allowance for the effects of chance, at least when the number of responses is three or fewer. The formula is

$$\text{Score} = \text{Right} - \frac{\text{Wrongs}}{n-1}$$

where n is the number of responses presented. Therefore for truefalse and two response tests, the score=rights—wrongs. For 3 response tests, score =rights—½ wrongs. For 4 response tests, score=rights—⅓ wrongs and so on. The procedure in True-False is :—

Total number of items	= 100
omissions	= 3
number attempted	= 97
number of wrongs	=13
number of rights	=97-13 =84
Rights--wrongs	=84—13 =71 score

or (number attempted...2 wrongs)

(2) Some like McCall believe in giving instructions to guess, so that the guessing may be corrected by the formula. Others like Ben Wood give the instruction not to guess and then correct for chance. Still others ask pupils to register their states of assurance by different symbols such as A against "absolute assurance" B for "fairly sure" C for "little or no confidence in correctness" D for "pure guess". It is found that even with the D responses,— there is generally a preponderance of correct answers, showing that pure guessing is comparatively rare. Morons have been found to guess but not normal people. When we compare reliabilities for examinations which have been, and have not been, corrected for chance, it is discovered that corrections for chance resulted in lessened reliabilities. If pupils are asked not to guess but to omit doubtful items, the evidence goes to prove that the average scores are reduced; the validity is therefore greater. Instructions not to guess are more necessary where there is no correction for chance. To instruct not to guess and then to correct for chance is the best kind of technique; but even then it is better to rely upon

longer examinations. 150 items given under "guess" instructions are at least as valid as 100 items given under "do not guess" instructions with correction for chance. The practice of instructing pupils to guess does not result in a better working of the correction for chance formula. When corrected for chance, all the average scores of the recognition types are approximately equal, except in the case of the true-false which seem to be reduced. Hence we could conclude that the correction is just in the other recognition tests but that in the case of the true-false, there is over correction.

Construction of Educational Tests

The construction of a test has at least 5 distinct parts, the validation of the test, breaking it into equivalent parts, the derivation of norms, calculating its reliability coefficient, perfecting the methods of administering the test such as manuals and keys. We have already discussed the means of validating a test. We may speak here of *scaling* the test. The selected items should be tried on an average group with unlimited time and then the items should be arranged in an order of difficulty. This introduces the idea of weighting or scaling. There are three kinds of scales,—quality scales, product scales with weighted values and product scales with unweighted values. Quality scales are best exemplified in the Thorndike Handwriting scales, and the Hillegas composition scale. The quality of the exercise is judged by 100 or more competent judges. Their ratings are then pooled in a special manner in a scale of 10 points. Then the specimens are arranged in an order of merit, based on the percentage of judgments which make one superior to the other and according to the "Cattell-Fullerton equal distance theorem". The theory is that if 50% of the judges say that x > y there is no ascertainable difference in merit between the two. As the percentages rise over 50, we could be more and more sure that x > y. Finally, when 100% agree that x > y, the chances are that it is true. Fullerton's table shows the increasing increment for each rise of percentage over 50.

The formula is % $\frac{r \text{ is } \Delta}{\text{P. E.}}$ (Probability Integral)

50%	.00
51%	.04
52%	.07 &c, etc.

Product scales with weighted values offer more credit for the difficult items according to a scale. The possibility

of such a scale depends on the accuracy with which we could quantitatively measure the differences in difficulty on the condition, that difficulty alone is the cause of the difference. Often an easy question because it is unusual floors the pupil and hence unimportance is given greater credit. To the class of unweighted product scales, belong age, grade and percentile norms. In these cases though the equality of the increments could not be accurately determined, by giving the test to a large number of the same age or grade, the inequalities are omitted from consideration.

The splitting of the test into two equivalent forms should be carefully made. The items should be arranged in an ascending order of difficulty, i. e. according to the decreasing percentage of successes. The two forms should be made up as follows.—

A. 1, 4, 5, 8, 9, 12 etc.
B, 2, 3, 6, 7, 10, 11 etc.

To put the odd numbers in one and the even numbers in the other, would make the odds markedly easy, since each odd item would be slightly easier than its paired even item. The two forms should be tried for equivalence. If their means and standard deviations agree within 0.5 points they may be taken as being equivalent, The discussion of time limits for a test brings into consideration two kinds of tests viz., *speed* tests and *power* tests. Speed tests have sharp time limits and the scores are designed to show the quantity of accomplishment per unit of time. They are completed only by the most rapid of workers, if at all by them. Except in reading and arithmetic, speed tests have very little use. Speed is an evidence of mastery rather than an end in itself and speed scores are less reliable than accuracy scores. Power tests are meant to show not how fast a pupil can work, but what is the most difficult task which he can perform. For this purpose time limits ought to be generous. Theoretically speaking, there should be unlimited time, but actually there should be a limit, otherwise some will go on working indefinitely. Either, have as limit the time taken by 90 or 95% to complete, or take the experimental time to be the maximum and give three pencils each blue, red and black. If 25 minutes, is the experimental time, call "time" at the 20th minute and let them change from black to red and at 25 from red to blue and at 30 from blue to black. Correct on a 20, 25, and 30 minutes' basis. Another method will be to

announce the time every half minute and to make the pupil enter it in his book. In this way the optimum amount of time required may be determined. Time limits do not decrease scores and unlimited time does not improve them. This has been determined by experiments, which show that there is close correlation between the results of limited time, double time and unlimited time.

It now remains to derive norms which are of two kinds· grade norms and age norms. The distinction should be made here between standard and norm, for confusion is created if we speak of standardising a test when we are only deriving norms for it. Norms represent the actual levels of achievement of typical school children under controlled conditions; while standards imply an ultimate goal to be achieved. For instance the standard of accuracy in addition is 100 % in all grades, while the norms may be 43.1 in grade IV, 60.4 in V, 68.9 in VI, 64.2 in VII and 67.2 in VIII.

Norms have many uses .—

1. They give meaning to tests 2: They afford a basis for the evaluation of school instruction. If achievement falls conspicuously below norms, an investigation should be made into its causes. 3. They serve as goals to stimulate pupil effort : 4. Comparison of pupil achievement with norms are helpful in diagnosing pupil difficulties 5. They indicate whether a pupil is working to the limit of his abilities 6. They are useful for classifying and grading pupils.

Grade norms are obtained by giving the test in question to a large and unselected group of children in the grade for which the norm is required, under conditions which would be common when the test is used later on. The median achievement of the pupils constitutes the norm. It is a convenient unit of measurement though liable to vary as between school and school, and as between country school and city school. Hence reliability is affected. Grade norms are not easily comparable with mental tests which are based on age, whereas in grades children may and do differ in age. For their proper interpretation chronological and mental ages have to be taken into consideration.

Hence *age norms* are gradually supplanting grade norms. Within a grade it is found that, the median achievement of older pupils is lower than that of younger pupils, because they are either retarded or dull. Hence age

norms will provide a better standard of comparison for the achievement of individual pupils. Age is a natural unit and it permits of ready comparison with the results of mental tests. Age standards reveal faulty grade classification. Age is uniform throughout the country and does not differ, as do the grade systems of Travancore, Cochin, Madras and Ceylon. Age norms represent the median achievement of unselected children belonging to particular ages.

Derived Scores: The point scores in tests are often expressed.in a variety of units. On long tests the unit of measurement may be larger and on short tests it may be small. Before such scores are compared one with the other, they should be reduced to a common denominator. The new score is thereupon called a derived score. Thus the 7th grade norm on the Thorndike—McCall Reading Test is 56 while the same grade norm on the Iowa High School Reading Test is 92. One way of circumventing this difficulty, is by expressing the point scores of a test in terms of the grade norms for the test. These have been called B scores. If 56 is the eighth grade norm any point score could be easily expressed in terms of the norm. Thus a pupil's 54 will have the value 7·5, 58 will have the value 8·5 and so on. When the performance of any boy in a number of standardised tests is expressed in a figure according to their grade equivalents, it is called an *educational profile*. (McCall and Fixeler: *How to Classify Pupils*). Age scores are frequently used as derived scores. If it is a mental test it is a mental age; if an achievement test, it is an achievement age. Thus if it is found that a score of 46 in any one test is typical of children of ten years and 3 months, whoever makes this score irrespective of chronological age is said to have a mental or achievement age of 10 years and 8 months.

Holzinger: *Statistical Methods for Students in Education*
King: *Elements of Statistical Method.*
Rugg: *Primer of Graphs and Statistics.*
Tiegs and Crawford: *Statistics for Teachers.*
McCall: *How to Measure.*
: *How to Experiment in Education.*
Rusk: *Experimental Education.*
Kline: *Psychology by Experiment.*
Good: *How to do Research in Education.*

Teachers College Record Volumes.
Travancore Reforms Committee Report.

Jivanayakam: *Training Teachers for English Schools in Travancore.*

Statistics is derived from an Italian word *statista* meaning statesman and was designed to compare one state with another, for the sake of guiding political action. Nowadays the term is not confined to data connected with the state alone, but is extended to other fields such as Biology, Astronomy and Sociology. Some have defined Statistics as the science of counting. This is misleading; because we do not necessarily count but often only estimate. Thus the crop reports of a country are not the result of actual counting; but are more or less accurate estimates. This definition gives undue emphasis to the *collection* of data, whereas their interpretation by analysis is equally important. One of the chief objects of statistics is to give a bird's-eye view of discrete data and so makes considerable use of averages. So Bowley defines it as the science of averages. This definition errs by defect, because modern Statistics shows, variation, comparison and relationship as well as, central tendencies. Hence we may say that, "The science of statistics is the method of judging collective natural or social phenomena, from the results obtained by the analysis of an enumeration or collection of estimates".

Statistics simplifies large and complicated numbers, so that the mind could comprehend them in one single view. Thus if the number of homicides in various countries in any one year is given, the mind simply reels at the number of facts to be assimilated. But if the simple statistical device of reducing these raw figures to so many for a million inhabitants be adopted, not only could the mind take them

at a glance, but could easily compare the incidence of homicide in the different countries as in the following table :—

United States (1927)	87	per	million
Czechoslovakia (1927)	27·9	,,	,,
Germany (1928)	21·7	,,	,,
Belgium (1925)	19·1	,,	,,
Australia (1928)	17·4	,,	,,
Switzerland (1925)	16·5	,,	,,
England and Wales (1927)	7·2	,,	,,

Facility in comparison is one of the uses of statistics. Such comparisons could not only be made between one country and another, but between the past and the present of the same country. For instance the growth of divorce in the United States may be denominated as in the following table:—

1886—1896.........	70	per	1000	marriages
1896—1906.........	84	,,	,,	,,
1906—1916.........	108	,,	,,	,,
1916—1926.........	150	,,	,,	,,

Such comparisons disclose a problem and the social thinker at once proceeds to investigate, the underlying causes. Statistics, by merely presenting in juxtaposition, two series of data suggests a relationship between them, as in the following cases:—

America : *Enrollment* (per 10,000 inhabitants)

	High School	College
1890	56 8	24·9
1900	91·4	31·2
1910	120·4	38·4
1920	234·4	56·1
1926	352·7	88·6

Deathrate from all causes (per 1000 inhabitants)

	Infant mortality	all ages
1900	... .	17
1910	... ...	15·4
1920	86·6	13·2
1926	74·3	12·0
1927	64·7	11·0

Percentile increase in Books published in the U. S. A.

	Science,	Fiction,	Biography,	Juvenile,	Travel,	Religion, and Philosophy
1920-25		20	20	25	40	80
	increase in population 8.4%					
1925-27	14	19	,,	24	69	82
	increase in population 2.8%					

Savings deposits in dollars *per capita* of the population

1920—140	1924—186
1922—160	1926—211

Assets of Building and loan associations in dollars *per capita* of the population

1920—28·83	1924—41·91
1922—308·9	1926—54·08

(Tables taken from Bagley: *Education, Crime and Social Progress*)

From these tables, we may infer with a certain degree of probability, that the spread of education had improved the longevity of the population, its consumption of good literature and its saving power.

Statistics is a method and a specific tool of thinking. In the social sciences which treat of man, the resemblance between man and man, makes generalisation possible but their differences, make such generalisations unreliable. In the physical sciences there is more uniformity of phenomena and so large and reliable generalisations are possible. In the Child Study movement the excellent studies made of individual children, in its early phase led nowhere. Hence it proceeded to study large numbers of children by the questionnaire method. This resulted in contradictory conclusions, as the observers were inexpert, and the method itself unscientific, owing to the vagueness of the questions which were interpreted by different observers in different ways. The conclusions of the child study movement therefore, are at best interesting hypotheses, which require verification by more exact methods. So investigators have been driven to study larger and larger numbers and to perfect a scientific method for dealing with such large numbers. Hence arose the application of statistical method to educational problems. In education generalisation is rendered possible by the Law of Statistical Regularity or the Theory of Probability which states that a moderately large number

of items chosen at random, from among a large group, are almost sure, on the average, to have the characteristics of the larger group. Thus if one blindfolded person were to pick up 200 potatoes from a bin containing a 100,000. the average weight of the 200 will not differ very much from the average weight of the 100,000. Even this likelihood of error diminishes, when larger and larger numbers are picked up, which suggests the supplementary Law of the Inertia of Large Numbers. When large numbers are considered, individual differences tend to be ironed out, because if one set varies in one direction, the variation is off set by another set which varies in the opposite direction. Thus the amount of wheat produced in anyone locality may vary from year to year, but the total wheat production of the world remains more or less stationary. The amount of insurance paid in Madras in a certain year may be ten times what was paid the previous year; but the percentage amount paid throughout the country remains more or less the same.

Hence the spirit of the time demands, that conclusions be based not so much on the distinctive reactions of one or two individuals, but upon the observation of large numbers of individuals, the measurement of their common likenesses and the extent of their diversity. As the data gathered becomes extensive, it becomes necessary to have methods of organisation to bring the facts within the compass of our understanding, methods of analysis to make the essential relation appear out of the mass of detail in which they are hidden, and methods of classification and description, to facilitate the presentation of data for the study and consideration of other persons. When individual observations widen, it is necessary to use numerical methods of comparison, for verbal language is inadequate as it is subjective, words not having the same meaning for all. "The *sometimes* of the cautious, is the *often* of the sanguine, the *always* of the empiric and the *never* of the sceptic, while the 1,10,100,1000 have the same meaning for all mankind".

Thus statistical method tends to become more and more the language of research. The essential characteristic of statistical inference has been well explained by Clerk Maxwell. He classifies all scientific investigations into three types—the historical, the mechanical and the statistical. An *historical* investigation is concerned with a single event, its causes and consequences, or with a series of single events in a time sequence. Most case studies in education, psychological

work with individuals, and most laboratory experimentation are of this kind. A *mechanical* investigation ends in the formulation of a single immutable law or principle which holds true without exception in all cases, in which the original conditions are fulfilled. Investigations in Pure Mathematics and some in Physics are of this type. The object of a *statistical* study is not a single event or individual, but a group of events or individuals, and the result is not an immutable law which is inevitably true for all members of the group, but it is only the statement of a tendency, which is true for the group as a whole but need not be true of any individual in the group. So Statistics deals with *trends* rather than laws, with *probability* rather than certainty. Educational problems are concerned with groups, their main trends and the variability of individuals.

The following statements of the Travancore Education Reforms Committee are typically statistical. "It cannot, we think be a conicidence that taluks with large numbers of incomplete schools show almost the lowest literacy figures for men and women in the State" (Report p 91) "...there is a definite relationship between the state organisation of primary education and the literacy figures for each taluk in the State. When primary education has been well organised, the taluk literacy figures are high; and where the organisation has been bad and the provision of schools unsatisfactory, the literacy figures are low. This is, especially the case in so far as girls' education is concerned" (*ibid* p. 258).

Statistical method is not an end in itself; but it is a tool for organising facts, so as to render them available for the study of the philosopher, the historian, the psychologist, the curriculum maker, the sociologist and the administrator. A statistrcal study can only describe what *is*: it cannot determine what *ought to be*, except in so far as it shows the consequences and concomitants of any readjustment. This is one of the limitations of statistics. Another is that the statistical norm is a fact and not a standard to which conformity should be enforced, all deviations from it being considered undesirable. Statistics may mislead where the assembling of data has been defective and its interpretation faulty. To have a proper perspective of statistics, we should recognise three phases of it. There is first of all a statistical *theory* which has been developed mathematically for an ideal situation seldom completely realised in practice. Statistical *method* uses these ideal formulae, for getting the meaning

out of recalcitrant facts. Statistical *information* is the result of employing statistical methods on facts and may be right or wrong according as the method has been properly or improperly handled. Even the statistician recognises a probable error which must needs, be when he generalises from 500 cases to cover 50,000 cases. But this error is no mistake but only a reflection of the constitution of the universe which is not uniform but multiform. Statistics is only a kind of language, an abstraction, to express experience, when it passes beyond the individual limit. As words have a general meaning which becomes specific in a particular context; so too a general statistical statement when applied to a particular situation may have to be greatly qualified. As H. G. Wells says "The new Mathematics is a sort of supplement to language, affording a means of thinking about form and quantity, and a means of expression more exact, compact and ready than ordinary language. The great body of physical science, a great deal of the essential facts of financial science and endles social and political problems, are only accessible and only thinkable to those who have had a sound training to compute, to think in averages, maxima and minima, as it is now to be able to read and to write."

Statistics is of the greatest importance to teachers. A knowledge of statistics will enable a teacher to understand and interpret educational science; it will enable him to do his daily work effectively; if he knew statistics, it may be possible for him to make real contributions to our knowledge of education; and as Claparede says, it will give him a new interest in teaching. We have already said that statistics is a new kind of language in which the facts of social and natural phenomena are couched. Statistics is becoming increasingly the language of educational research and a teacher who is not familiar with statistical terminology, will not be able to read and understand works on educational science. "There are now hundreds of volumes on school surveys filled with tables and diagrams; there are books, monographs, theses and reports likewise replete with statistics; there are scores of Government, state and institutional pamphlets; there are hundreds of standardised tests; and there is an ever increasing amount of periodical literature reporting the findings of quantitative studies" (Holzinger: *Statistical Methods* p 2) If the teachers are ignorant of statistics, they will be unable to read the professional literature. The teacher should also be in a position to critically evaluate new systems and methods,

supported by statistical data. Not all such systems are sponsored by men of scientific rectitude. Though "figures cannot lie, liars can figure". The teacher must be in a position to discover and expose such interested propaganda.

In the teacher's daily task, the use of statistics is called for more and more. "In the application of standardised tests to such problems as classification, vocational guidance, diagnosis of special abilities, and evaluation of methods of instruction, a sound knowledge of statistics is imperative" (Holzinger: *op. cit.* p. 2). The teacher can find out the achievement of age levels and grade levels, discover the variability or homogeneity of the pupils in a class, find out cases of class overlapping, compare the achievement level of his school with other schools, by means of grade norms, see if the achievement of the pupil keeps pace with his ability and measure how far his school has benefitted the pupils (Otis *Statistical Method* Introd). Often the teacher could himself carry out simple experiments to find out, which of several competing methods of teaching gives the best results when applied to his pupils. Thirdly, every teacher must also be a research worker and make his contribution to educational science. The progress of educational science depends upon the extent of data utilised for formulating general principles, and hence if the workers in the field are equipped with statistical knowledge, they would be in a position to add to our knowledge of the educative process. Finally, as Claparede says, to have carried out even a small piece of research, is greatly to add to the mental equipment of the teacher, which could not but enhance his teaching power and his interest in his work.

Statistics is invaluable to investigators. Those who construct and standardise intelligence tests and achievement tests have to make use of elaborate statistical techniques. Several investigations have been carried out, as to the effects of entrance into the school, on the physical and mental development of the child. One investigator in Bohemia found that with 21 per cent of the pupils, there was decrease in weight during the first school year, and with 25 per cent no increase. An observer in Germany discovered that in the first three months of school, the weight of girls decreased and among the children of seven those who attended school were smaller and thinner than those who did not. The rate of mortality among children who attended school was also great. Winch, who studied the effects of early entrance to school life on school progress, came to

the conclusion that those who enter school before five do not progress more rapidly or decisively than those who enter after five. The same problem was studied by Ayres in the case of 25,000 American city school children. He came to the conclusion that the child who entered at an advanced age made more rapid progress than one who entered earlier, though not enough to overtake the latter. The age of six, he found, was the best to start schooling. Such investigations as well as medical inspection reports were responsible for the attempts to fit the school to the child as the Montessori "Houses of Childhood" and the nursery schools. General truths such as that "the higher the social status of the parents, the better the bodily development of the children" have been established though statistical studies on hundreds of Glasgow children.

Height	Boys inches	Girls inches
Children from homes of one room	46·6	46·3
" " " two rooms	48·1	47·8
" " " three rooms	50·0	49·6
" " " four rooms	51·3	51·6
Weight	Boys lbs.	Girls lbs.
" " " one room	52·6	51·5
" " " two rooms	56·1	54·8
" " " three rooms	60·6	59·4
" " " four rooms	64·3	65·5

(Rusk : Experimental Education Chap. 3)

Statistics is indispensable for administrators. Educational programmes in America are based on school surveys conducted by educational experts. Most States and cities have completed such surveys and have thereby laid down a programme of school development. The surveys generally find out the existing school provision, estimate the additional provision needed and make suggestions for meeting the additional need. The proposals are adopted by the State or City and the necessary financial appropriations made. In India, Travancore and Baroda have conducted similar surveys. These surveys are statistical and could be carried out only by people with statistical training. The need for statistics in the proper administration of education is well recognised. The Board of Education in England has a large staff of statisticians who publish accurate facts and figures about the position of education in

England. The Bureau of education in the United States has the maintenance and publication of accurate statistics as one of its chief functions. The Educational Commissioner performs this function for India and his Quinquennial Reports contain the official statistics of education in India. Statistics suggest policies. Thus a study of the comparative statistics of Primary and Secondary education in Travancore, made the Reforms Committee suggest ways and means for diverting pupils into vocational and prevocational courses. (Report p. 174) When compared with the wastage in the primary schools of Travancore the wastage in secondary schools is negligible. While in Travancore the percentage of pupils in the secondary stage to the total population was 2·8, in England it was only 1·2 and in Madras 0·8. Statistics also enable administrators to carry on propaganda on behalf of education Comparative statistics of literacy figures for India and other countries showed the backwardness of mass education in India and led to increased effort to improve Elementary education. In 1881 six per. cent of the males over 5 in India were literate, 11 per. cent in 1911 and 13 per. cent in 1921. The percentage of literates among women was 3. For both men and women it was 8. It will take two centuries of the most efficient methods, if the 90% level of literacy in England is to be reached. The progress of consolidation of rural schools in America progressed by propaganda, which showed the advantages and economy of putting inefficient and weak rural schools together into large and well equipped central schools. The public demands to know what the schools are doing and statistics supplies the answer.

The traditional pedagogy was not scientific-in character. It relied either on experience without generalising it into principles, or accepted principles without verifying them by appealing to experience. Thus the recapitulation theory was accepted without proving the parallelism, or determining the points of correspondence between racial and individual development. Simlarly, the theory of Formal Discipline was accepted uncritically. The new education claims to be scientific, discards *apriori* methods follows the inductive methods of research, uses the experiment to verify conclusions and to formulate principles, and expresses its data in quantitative terms. (Rusk: op. cit. chap I). At one time, authority ruled the practice of education. Custom, empirical findings, and speculation determined educational practices. It is only recently the scientific method has been adopted. The application the scientific method to

educational problems has involved the formulation of the problem, the assembling of the data critical, analyses of the data, developing hypotheses and testing their validity— in short the steps of reflective thinking. Until now, the faults were, accepting opinions as fact, quoting the authority of a person or committee or of a majority, and reasoning from analogy. The characteristics of scientific procedure are five in number 1. Mathematical precision. Science deals with quantitative material, not vague description. Thus a writer describes American schools as "enormous", when out of.19,442 schools only 614 enrolled more than 1000 pupils, 13 more than 5000, 9150 were with 100 or less and the average was 199. Thus in prescribing reading material for children, instead of relying on the opinion of individuals we make word frequency lists, get accurate information of children's preferences and thus make up the readers. 2. Objectivity. Science uses objective material which have the same meaning for all and not subjective impressions, feelings, ideas and beliefs. The Formal Disciplinists held to their opinions out of sheer prejudice or self-interest; but the data which disproved their contentions are objective which every one can examine for himself. Thus to base the effect of tobacco on mental efficiency on the opinion of eminent men is to be unscientific.

3. Verifiability. The data on which conclusions are based, should be available for inspection by all. Dr. Burt proved from certain data that a child's mental age was more due to training than to endowment and so did Dr. Bagley; but Freeman and Holzinger have shown by the same methods that it was possible to show that the chronological age also was due to training.

4. Impartiality The student should not prejudge the problem but should approach it with the open mind. Darwin was a model in this respect, as he made a point of entering that which did not agree with his views.

5. Expertness. Those who carry on the study should be expert in the technique of interpretation.

The philosophic method was more common in the solution of educational problems in olden days because education was an offshoot of philosophy. In the opinion of some philosophy cannot be a method in research. Philosophy uses the deductive method of proceeding from generals to particulars, Research is the

arrangement of observations and so depends upon collected data. Philosophy is not interested in the reduction of observations; if it is, it ceases to be philosophy and becomes science. Philosophy accepts the generalisations of science and starts from them to piece out an explanation of the whole of reality. The philosopher uses his study and not the laboratory. But there is a field in education where the philosophical method is applicable. Philosophy can to a large extent lay down the aims and values of education. Besides, even in other fields, philosophy and research go hand in hand. Without philosophy, research lacks interpretation; without research philosophy lacks concreteness. The curriculum has been mainly laid down by philosophical speculations. McMurry has published a numbered list of abstract principles which he says should be the guiding philosophy of education. Philosophy will be useful in evaluating scientific contributions. The historical method of research, involving a great deal of documentary study was popular for a time. This was followed by studies in comparative education. The questionnaire and survey methods of research were very much in vogue until recently. But now the statistical method is growing in importanc. A corresponding change in the instruments of research, has been noticed. Out of 204 dissertations submitted for the doctor's degree in Teachers' College of Columbia University between the years 1905 and 1926, between 1905 and 1915, foreign languages were used as instrument by 38, statistics by 41 and neither instrument by 30. Between 1916 and 1926 only 16 used foreign languages, 78 used statistics and only 18 used neither. Hence it may safely be inferred, that the statistical method is becoming more and more the language of research in education. While formerly a foreign language had to be offered as a prerequisite for a doctors' degree, now statistics may be offered instead.

Statistical methods are applicable to several kinds of problems in the educational field. The earliest studies, worth mentioning, are those of Weber and Fechner, on the sensitivity of the skin. Weber discovered that if he had a weight of 32 drachms in his hand and added 10 drachms more, the hand felt the additional weight; but if he added the 10 drachms to 32 ounces, he did not feel the difference until 10 ozs. were added. As a result of a large number of similar experiments, he formulated the law that our sensitivity does not depend upon the absolute amount of stimulus but upon the relative amount. Fechner, continuing the work, after thousands of experiments, came to the conclusion that

the activity of the mind proceeds slower than the corresponding activity of the brain. Since then a great diversity of similar experiments have been carried out, on various types of reaction. One example, in which tactual reaction time is measured, should suffice. A group of fourteen students stand in a circle, one with a stop watch. At the word "Go", sounded by an outsider, he starts the watch and at the same time, touches his neighbour who touches the one standing next to him as soon as he perceives the touch, and so the touch is passed on, until the last man touches the starter who stops the watch, as soon as he feels the touch. The time is found out. At least twenty such trials are made in the course of one such experiment, and the results tabulated and statistically treated. The group average is obtained and divided by fourteen which gives the individual average. This is compared statistically with the results of other such experiments and the reaction times of auditory and visual stimuli. A great deal of work of this kind has now been achieved.

The measurement of fatigue has already been discussed (See *ante* pp. 313-318). In regard to hearing, we have spoken of the watch test and the whisper test. Acuity in hearing is measured by Seashore's audiometer. Discrimination of pitch is measured by means of tuning forks. In all these cases, norms have been established after a great number of measurements. From the time of William James experiments have been made on verbal memory. Now the technique of such experimentation has been greatly improved and highly reliable and useful principles connected with verbal memory have been obtained. (For a brief discussion refer, Starch: *Experiments in Educational Psychology*) Statistics has been of invaluable help in handling the results of these experiments. We have already shown how statistics is employed in constructing achievement tests and in applying them for classification and grading. We shall see hereafter, how this is true of Intelligence tests also. Intelligence tests have been used to sift the mentally defective and the mentally gifted, so that special methods may be used in educating children who belong to each class (See Later).

The average height, weight, chest capacity and span of arms for each age, have been determined for each nation by measurement on innumerable children, and these enable school authorities to find out the cases where normal growth has not taken place and to devote attention to such cases,

Besides, relative height and weight tables have been formulated, which show whether in any one case weight is proportioned to height. The order of growth, periods of growth, times of growth, have all been determined by anthropometric measurements (See Sandiford: *The Mental and Physical Life of School Children*). The influence on mental growth, of school life, of the age of admission, of the social position of parents, of physical development, have been statistically studied. The problem of sleep has been studied through experiments. The restorative nature of sleep, the different types of sleep, the amount of sleep necessary to recuperate from different types of fatigue, individual differences in sleep, the amount required for various ages, and the deficiency of sleep in school children, have been investigated and conclusions arrived at (see Claparede: *Experimental Pedagogy* pp 306—317.)

The question of educational finance, has to lean heavily on statistics for support. No programme of educational development could be undertaken without proper estimates of the financial commitments. Once a programme is approved, the devices for raising the money should be considered and this involves questions of taxation. The proper apportionment of expenditure among the different branches of education require comparison of norms and so unit costs have been elaborated. School accounting and school costs have statistical bearing. Graphs may be drawn of the increase in expenditure through the years as in p. 27 of the Tenth Quinquennial Review. The average cost per pupil, the total amount of expenditure in each of the provinces with the amount spent on each branch, comparative tables of expenditure, the different sources of income, are all matters of tabulation. Mr. Mayhew (Education of India p. 236) points out that between 1922—27, an increase of 13000 schools gave only an increase of 842,000 pupils or 26. pupils per new school. The average per school was 42, which would turn out on the average 3 literates per year, who may lapse into illiteracy, but who nevertheless cost Rs. 240 each to be taught to read and to write. Such figures serve as eyeopeners. The Travancore Reforms Committee (Report pp.77-78) found out by a study of the figures, that when expenditure on Vernacular education rose by a lakh per year, the number of literates added to the school was plainly negligible.

Statistics are the indispensable tool of educational administration. All educational control and direction rest upon good and reliable statistics. The number of schools

and the places where they are required, are all to be determined by statistics. The total number of school places required in any State or Province, will depend upon the population of the school-going age. The population between the ages of 5 and 11 has been discovered to be **14** per cent of the total population. Besides the census furnishes statistics of the number of children of each age and even of each place, and the educationist has to allot the schools according to these figures. The Champion Scheme in Madras is designed to make school provision meet school demand. The Travancore Reforms Committee has discussed the whole question in regard to school provision in Travancore in its Report pages 74-85. One instance to prove the importance of statistics in determining the number of trained graduate teachers for a school system may be adduced. The question really turns on finding out how many new teachers will be required every year. Or what the replacement turnover should be? The present writer investigated the question in regard to Travancore schools. Various ratios of replacement turnover were studied and compared with the objects of selecting one that will suit Travancore. The ratio for the U. S. A. has been said to be between 12 and 14 per cent, with American negroes 10, Lousiana 17, England 4.5 to 6, the United Provinces 6 in the case of Vernacular teachers. After discussing each one of the ratios, the formula of Buckingham was accepted as the most suitable. The formula says, that the number of replacements could be found out by dividing the total number of teachers by the average teaching life of a teacher. The result was found to be applicable to Travancore by a count of the additions to the teaching force made year after year, for several years. Thus the number of graduates to be trained every year was arrived at (Jivanayakam: *Training Teachers For English Schools in Travancore* p 91-95.)

Data

The concepts, facts and principles used as raw materials in research, are known as data. Since statistics deals with numbers, the data of statistical research should be numerical. Generally, they consist of age, height, weight, numbers, scores, marks of pupils, educational expenditure, salaries, accommodation, attendance, fees, number of teachers etc. Numbers presuppose units and hence the unit in a statistical research should be first determined. If the research deals with teacher provision for a state school system we should define what a teacher is for the purposes

of this investigation. Is he part time or whole time; man or woman; if woman, married or unmarried. Are teachers of drill, music and drawing included? If the unit is described so as to cover all questions arising in regard to it, we shall be clear in our minds, as to the subject of our inquiry. The unit should be so selected, that it could be easily ascertained. Thus "teacher" may be defined as one with a certain kind of qualification engaged in a certain type of school. Data from tests usually appear in the form of Mental Age or Educational age or points.

These data fall into series determined by a common character which is present throughout. Thus all measurements of weights of children fall into one series. Children divided according to class or caste or religion fall into appropriate series. On the basis of this common character, different types of statistical series are distinguished. Thus weights of different children will fall into an *ordered* series, because they could be arranged in an ascending or a descending order; but it is a matter of indifference in a classification of school children according to caste, whether we place Brahmin before or after Muslim or Christian. While weight, height etc could be described in *numercial* terms, caste or religion can be described only in *verbal* terms. Again measurements of weight will constitute a *continuous* series, because the units will vary in the most minute, fractional quantities; while the enumeration of pupil strength will be a *discontinuous* series as whole numbers will have to be utilised. In short data are either quantitative or qualitative. When intelligence is described dichotomously as high or low, we have a verbally ordered or qualitative series; when expressed in I Q's, we have a numerically ordered or quantitative series.

Data are either *primary* or *secondary*. Primary data are those which are collected by the investigator himself, by enquiry, observation, enumeration, counting, experimentation, measurement and questionnaires. Secondary data are those which have been collected by others and tabulated for some purposes or other. Such are official reports like the Census, Reports of the Directors of Public Instruction, Quinquennial reviews, official surveys, reports of commissions, former studies and investigations. Primary data are preferable but when the field is very wide, it passes beyond the individual's experience and becomes very expensive. It may be possible for Governments

rich endowments to carry out extensive primary investigations Statistical works like Charles Booth's "Life and Labour in London" and its recent revision are partly based upon personal enquiry. When the ground to be covered, is too wide for one person, enumerators are employed as in the census. This is too expensive for a private individual. Teachers have been able to carry out such investigations like Morison in his "Economic organisation of an Indian Province." Slater in "Some South Indian villages" and Mann "Life and Labour in the Deccan". Surveys are equally expensive. The Travancore Education Reforms committee cost the Government nearly Rs 30,000. In a survey only the most rigorous criticism can sift fact from opinion.

The Questionnaire method is cheaper, though not the best. A third or a half of the persons to whom the questionnaire is addressed, do not reply and the sampling is defective. The answers received may be biased. Very often the informant gives what the investigator wants rather than the fact. Besides, off hand replies are not always weighty To secure the good without the evil in the questionnaire method, certain cautions have to be kept in mind. It is advisable to get a list of persons whose answers are likely to be well informed. Their previous consent may be courteously taken for submitting the questionnaire and their replies ensured by addressed envelopes. Plainly worded unambiguous questions should be used, demanding facts not opinions. Such a series of questions should be asked as would corroborate and check one another. A large number should be addressed, so that the data may be representative and the error of one may be cancelled by errors in the opposite direction. Questions which require check marks or answers of "yes" or "no" should be preferred. Let the questionnaire be brief requiring only such matters as are absolutely essential for the study Questions should not be inquisitorial or such as would give offence, as when you ask a person about the effect of strong stimulants on his mental efficiency. Questions which are likely to receive biased answers, should be avoided, such as asking a lady her age, which will always produce an understatement. The questionnaire may be supplemented by personal interviews and "followup" correspondence.

Data secured through measurement are being more and more utilised in educational research. Such tests should be administered and scored by well trained people. The

Experimental method is being increasingly used in educational research. The essence of the experiment consists in the selection of a problem, and so controlling the conditions as to keep all elements and factors surrounding the problem constant, except the one to be studied and measuring the results. This isolation is secured by three types of experimental procedures :—the one-group method, the equivalent or parallel-group method, and the rotation group method. For example, a class may be given a number of forms of a standardised reading test, spread over a corresponding number of weeks, to measure the effect of different methods of improving reading performance, such as encouragement, skimming, discouragement and reproduction. The effects of each one of these inducements to improvement, may be measured against the normal. The equivalent group method, first of all secures, by means of appropriate tests, two equivalent groups. To measure the effect on comprehension of two readings and one reading respectively, the same body of material was given to one group to be read once and to the other to be read twice. The effect on comprehension was then measured by a test. Many such experiments will be used and the results statistically analysed, before any conclusion is arrived at. The rotation-method is meant to rotate out "interference" by unlooked for factors in the equivalent groups. An experiment was made according to this method to determine the respective merits of reading the text book alone, and reading text books and supplementary materials also. Eight topics were chosen. Group A read text books only but Group B did supplementary reading also, on the first two topics. In the next two topics the position was reversed, B reading text books only, A supplementary reading as well. In this way the position was reversed three times. If the group that did supplementary reading always proved superior, the deduction is plain, that the method of providing supplementary reading is superior absolutely. The action of such unlooked for factors as industry will be rotated out. Experiment should be first analytic studying small parts of a general mental process and than synthetising the results to be applied to the explanation of the general mental process.

Seconday data have to be very critically handled. Official reports are usually reliable as Governments have the necessary facilities and the qualified collectors. In the case of a riot, or an earthquake, or a flood, or an epidemic, or similar such calamities, newspapers, in order

to create a sensation, publish scare headings and exaggerated figures of casualities. When the official reports come, soberer estimates are reported. Again secondary data are not available in the form in which they are to be used in the investigation, having been collected for some other purpose. Thus in the annual Reports of the Travancore Education Department the division is not into elementary secondary and collegiate; but English and Vernacular. Hence information in regard to the number of children in the primary grade or the expenditure on primary schools, is not available. Neither can we find out the number of boys in girls' schools and the number of girls in boys' primary schools. These data had to be obtained by laborious calculation. In a study of overlapping schools, the distance of school from school, the age of foundation and comparative strength were not available in comparable form and had to be prepared specially. Secondary data may have become out-of-date, by the time the researcher makes use of it.

Nature is uniform and despite individual variations, there is a tendency to approximate to the norm, if a sufficiently large number is selected. This we have stated as the law of statistical regularity with its corollory the inertia of large numbers. But the regularity depends upon the large number of cases selected, their representative nature and their accuracy. If large enough numbers are selected, the variations in one direction may by compensated for by variations in the opposite direction. Then there will be safety in numbers. But numbers by themselves do not secure reliability. The data should be *representative*. If we are required to find out the average height of boys of fourteen in the Madras Presidency, we cannot arrive at the true average, by measuring only boys of fourteen who are in schools, who are apt to be well nourished. We should include the well fed and the illfed, the rich and the poor, the educated and the illiterate, the vegetarians and the non-vegetarians, the city dwellers and the country dwellers, the high caste and the low caste. In short our data should be completely representative of the various types. This introduces the question of *sampling*. Our average would certainly be absolutely accurate, if we measure correctly—a mighty big *if*—all the boys of fourteen years. That is not necessary. A sufficiently large sampling of the whole fourteen years old population, would give an equally accurate average. This is proved in a research of Mr. Ben Wood, concerning the home conditions of school

studied. We may give a part of the tabulation as given by Holzinger, selecting only one aspect of the home condition.

Guardianship	64f8 children		
	one-fourth	three-fourths	all
Father	83.4	82.4	82.4
Mother	13.3	14.1	13.9
Uncle	0.6	0.6	0.6
Aunt	0.4	0.2	0.2
Stepfather	0.7	0.9	0.9
Stepmother	0.2	0.2	0.2

This table proves, not merely that a sampling gives almost as good result as a whole; but that a large enough sample, gives just as good a result. But what is a large enough sample? Take first fifty at random and find out the average and variability. Add another fifty and the resulting average, may be quite different from the first fifty. Add another fifty or one hundred and the resulting average may be near the second average. Proceed in the same manner until the average is fairly steady, and then you have a random workable sample (Rugg: *Primer* p. 63). It is not necessary to pick and to choose our cases. We may put the cards into a hat, shuffle them and select the number required. Or we may arrange the names of the boys in alphabetical order and select every alternate card or every fourth, provided the group is more or less anonymous and homogeneous without marked types, in which case we should have sub samples.

The data should be accurate. Absolute accuracy is not available in statistical research and may not be necessary because our data is not accurate. Even physical measurements could not be absolutely accurate. We may measure the length of a line by a ruler, in whole millimeters and a certain amount of accuracy may be reached. When a vernier is used, a greater accuracy to tenths of a millimeter, may be reached. When more refined measures are used, the accuracy may be stated within a thousandth part of a millimeter, still the measurement will not be absolutely exact. The age of a boy is not stated correct to the exact day, his height to the correct tenth of an inch, or his weight

to the correct thousandth of an ounce The discrepancy is spoken of as an "error" and in statistical measurement, it is better to recognise the standard of accuracy we are using. If this is so in physical measurements, it is more so in social measurements. The difference between the true value and the obtained value, is spoken of as an *absolute* error. Thus if two measurements of a line gives 84.8 and 84.3 respectively, while the true measurement is 84.5, the absolute error in the first case is +3 and in the second case— 2. The ratio of the absolute error to the true value is the *relative* error. In the above case they will be +·003 and—·002 or+·3 per cent and —·2 per cent. We may take a number of measurements, and their average we take to be the true measure.

Errors are either unbiased and compensatory, or biased and cumulative. An example of unbiased error is afforded by the practice of rounding off numbers. In speaking of large numbers, it is customary to speak in thousands, all above 500 being considered 1000 and all below 500 being discarded.

Pupils in public institutions in Madras.

Year	Actual number	Thousands of pupils	Errors
1908—9	981,223	981	—223
1909—10	1,051,966	1,052	+ 34
1910—11	1,087,562	1,088	+438
1911—12	1,152,886	1,153	+114
1912—13	1,245,950	1,246	+ 50
1913—14	1,345,554	1,346	—446
1914—15	1,417,840	1,418	+160
1915—16	1,491,945	1,492	+ 55
1916—17	1,527,039	1,577	— 39
Total	11,301,965	11,302	+143
average	1,255,774	1256	16

(Seventh Quinquennial Review Vol. II p. 100).

In such a short series the "error" is only 143 which is negligible in 11 millions; but if the series were longer, the error will be smaller still. The error in the rounded average is only 16.

Biased errors instead of neutralising one another, are cumulative and make a larger error in the total or in the average. Biased errors are due to the inaccuracy in the standards of measurement. If 5 measurements are taken with a chain which is 5 links short, in a total of 500 links there will be a shortage of 25 links, in a total of 1000 links 50. Thus the errors go on increasing with increasing numbers. If women have a weakness for understating their age, in a computation of the total and average age of 10,000 women, there will be a larger error than in one of 1000 women. Biased errors are found in teachers' marks.

The digits in a number which is known to be correct, are called significant figures. Thus a measurement of 68·3 mm. is correct to the tenth of a millimeter and may lie anywhere between 68·25 and 68·35. The convention of regarding a measurement such as ·0488 inches as correct to three places may be noted, as the Zero simply fills a place. If Zero is to be considered significant, when occurring to the right of numbers, the fact should be indicated by a decimal point after it e. g 320. which will lie between 320.5, and 319.5, whereas 320 is correct only to one place and will lie between 315 and 325. Such considerations should be kept in mind in tabulating teacher's marks and pupils' ages.

Errors in educational measurements arise out of the qualitative nature of class-room products. A test in arithmetical ability, can measure only on a scale, where the units are not equal like an inch or a pound. Again a test can measure only by sampling, and not in the sum. A number of spelling tests could give us an idea of the spelling ability of the pupil, but it cannot give us an idea of all that ability. Moreover, the score on one test can only be approximately transmuted into another. Errors arise in the administration of a test, in the inability to follow the instructions faithfully, in scoring, and through the subjective changes in pupil attitude. Height and weight are static quantities which could be measured directly, while intelligence, lung capacity, handgrasp are dynamic and could only be measured indirectly by a reaction, in which the attitude or fitness may create variability and give rise to a *response* error. The change in a pupils' response in the course of a battery of equivalent tests may be due to practice, fatigue, emotional instability, the attitude of the examiner and the imperfections in the test. material. In such cases the true measure is not the average of a

number of observations, but the highest absolute performance. In the matter of arithmetical ability the highest may be the representative score, though the average may have prediction value. In lung capacity, the largest volume may be the truest measurement, as representing the potentiality of the subject. No amount of refinement in statistical technique can make up for errors in the data and so errors should be avoided.

Before tests could be made to yield their results and to show tendencies and indications, certain techniques should be used to summarise test results. These are statistical techniques. The most important of them are 1. Classification, tabulation and representation of data. 2 Computation of a common measure or the central tendency. 3. Expressing the variability or spread of data. 4. Expressing the relationship of groups of data. Classification and tabulation are necessary if the data are to become meaningful. Arranging in ascending or descending order helps picking out the highest and the lowest. When the scores are very large in number, such tabulation has very little meaning. Hence the scores should be arranged in groups, according to the frequency distribution. The following ungrouped scores given in (Holzinger and Mitchell: *Exercise Manual in Statistics*) will enable us to illustrate most of the processes involved:—

171	168	128	141	106	106	87	114	187	133
151	131	150	118	142	166	158	101	159	126
136	137	152	137	132	132	151	145	152	157
144	140	111	150	152	137	146	128	144	152
149	114	135	131	161	95	134	124	125	167

The first thing to do is to determine the *range*, which is obtained by subtracting the highest score from the lowest. In our example 187—87=100. The range is useful in determining the number and size of the class interval or *step*. It is better not to have fewer than twelve steps, for otherwise the error in the average becomes noticeable. If more than 18 or 20 steps are made, the labour in making the distribution is considerably increased. When the range and number of steps are determined the size of the step is automatically determined. Odd numbers are better than even numbers for the size of a group, since in the first case the midpoint is a whole number. The limits of the class intervals should then be decided. Since the mid-point is a whole number, the upper and lower limits should be frac-

tional whenever odd sized steps are used. In educational tests fractional scores are awarded, so a score of 42 may be taken as ranging all the way from 42.5 to 43.5, the most representative point being 43.

Interval	Class Value	Frequency	Deviation	Fd	Fd²	C. Fr.*
179·5—189·5	18[illegible]·5	fdo 6 1 Fdo 17	5	5	25	50
169·5—179·5	174·2	1	4	4	16	49
1[illegible]9·5—169·5	164·5	[illegible]	3	12 +52	36	48
149·5—159·5	154·5	f3 11	2	22	24	44
139·5—149·5	144·5	9 Fmd 9	1	9	9	33
129·5—139·5	134·5	11	0	0	0	24
119.5—129 5	124.5	f1 5	—1	—5	5	13
109·5—119·5	114.5	fup 8 4 fup 24	—2	—8 —28	16	8
99·5—109·5	104.5	2	—3	—6	18	4
89.5—99·5	94.5	1	—4	—4	16	2
79·5—89·5	84.5	1	—5	—5	25	1
		No=50		Σfd=24	fd2=210	

*Cumulative Frequency.

Graphic representation of numerical data makes a striking impression on the mind. Many graphic devices are used to present statistical data. The simplest are cartograms examples of which occur in Geography. Rainfall and temperature charts are familiar to everyone. The amount of wheat produced in the various countries may be represented on a world map by dots. Each dot stands for a million bushels and the number of dots in a country will indicate the number of millions of bushels grown. Pictograms are very useful to illustrate comparative dimensions. The armies of the various countries can be compared by pictures of soldiers. Thus the army of France will appear as a giant

while that of Bulgaria as a dwarf. The amount of wheat exported out of Australia and India respectively, could be represented by two sacks one big and the other slightly smaller. Bar diagrams are useful to represent the size of populations. The population of the British Empire will be a long bar, that of China will be less long, that of India shorter and of Germany shorter still. The device of differently coloured sectors of circles to show proportionate sizes, is common. If a circle represents the British Empire sectors will be cut in it proportionate to the size of India, Canada, South Africa, Australia &c.

When data is arranged in a frequency table, they may be easily represented in such figures as, Frequency Rectangles and histograms. Suppose we measure 500 maize stalks in a field and get the following frequency list :—

Height in feet	No. of Stalks Frequency	Cumulative Frequencies
2—3	30	30
3—4	80	110
4—5	140	250
5—6	160	410
6—7	70	480
7—8	20	500
Total	500	

Use graph paper and count heights along the horizontal, and frequencies along the vertical. If we complete the resulting figure for each height, we get a *frequency Rectangle*. If we do not complete the inner sides of the figures, we have a *Histogram*. If we join up the mid points of the outside boundary (i. e. the sides and the top) of each figure, we have a *Frequency Polygon*. When the line connecting the mid points, is brought to the mid-points of the next class interval in the base, we have a *Frequency line*, which smoothens out and becomes a *curve* when a large number of measurements is taken. When the number of cases is actually very large, this curve takes a characteristic bell shape and is known as the *Normal Frequency curve* or the Normal probability curve, or the Binomial curve, or the biological curve.

of a term, and their marks used to construct a frequency polygon, we could see at a glance whether there has been improvement or not, from the height of the second curve. But when the scores have different unit values or when the number of cases is different, the scores should first be transmuted to percentage frequencies.

When we plot the data given in the above table, in the cumulative frequency column, we shall get a cumulative frequency graph or an Ogive. It should be plotted on the upper class limit. The Ogive is good to compare data, especially when they are converted to percentages. The Ogive is useful for determining medians, quartiles, percentiles etc. Cumulative frequencies could easily be converted into percentiles. In our example, let us divide the number of cases in the class 2-3 feet, by the total number of cases, and we get .06 or six per cent. That is, when we reach to the top of the class, 6 per cent of the cases are below it. At the top of the second class 22 per cent of the cases are below; 50 per cent. are below the third; 82 below the fourth, 96 below the fifth and at the top of the sixth, 100 per cent of the cases are below.

The normal frequency curve is really the graphic expression of the law of probability or chance, which might be illustrated by the tossing of Rupees. If one Rupee is tossed the probability of heads or tails turning up is fifty fifty. If two Rupees are tossed there are four ways in which they may fall—two tails, two heads, one tail and one head and one head and one tail. That is, two tails will turn up one in four, or 25%, two heads one in four or 25%; and one head and one tail, two out of four or 50%. When three Rupees are tossed, the combinations will be 3 heads, one in eight or 12½%, 2 heads and one tail, three out of eight or 37½%; 2 tails and one head, three out of eight or 37½%; 3 tails, one in eight or 12%. This may be algebraically expressed by the formula $(H+T)^3$, where H represents the chance of heads turning up when three Rupees are tossed, $(H+T)^3=H^3+3H^2T+3HT^2+T^3$, where H^3=one chance to get 3 heads, $3H^2T$=3 chances to get 2 heads and one tail etc. We could express this Binomial in a graph and the larger the power to which it is raised the more bell shaped will be the curve and arrange itself on the Normal Frequency pattern. This curve holds true in the combination of chromosomes in heredity and also in other fields. So it is hypothetically taken to be a uniformity in nature. Hence if the results of a test arrange themselves in this fashion, we conclude the test is a good one. If the distribution does not show the symmetry of the normal frequency

curve, we may conclude that the data do not represent a random sampling. Or the lack of symmetry may bespeak a lack of homogeneity in the group. The normal frequency curve is, also used to measure the difficulty of test items and to scale them.

Skewness is the opposite of symmetry, in which the curve instead of showing the normal bell-shaped form has its base drawn to a greater extent to one side or the other. The curve is pulled to the left or positively by the bunching of a large number of high-valued items. Or it is pulled negatively to the right by the occurrence of a large number of low valued cases. These extreme cases will dislocate the mean, so in such cases the median should be used and not the mean. In averaging ages of university students in America, the median is used, since there are a few men and women of 50 and above who take university courses. In finding average incomes the presence of a few millionaires will make a great deal of difference to the average. If the average height of school children is computed to locate a drinking fountain, the presence of a few markedly tall children may fix the fountain too high for a few.

2. *Measures of Central Tendency.* The grouping of raw scores into frequency tables is one step in the process of condensing them so that they can be analysed and interpreted. Still, some single term or value which would represent the whole table should be discovered. This is near the centre and is called a measure of central tendency. The three common measure of central tendency are the arithmetic mean, the median and the mode. The first two are the most commonly used. The *arithmetic mean* is very easily computed for ungrouped data. It is the average which could be found by dividing the sum of the scores by their number. The average expresses in a compact form one specific fact about the scores in which each is a part. In the frequency distribution, it is a point on the scale such that the sum of the deviations of the value larger, exactly equals the sum of the deviations of the value, smaller than it is. We have to assume this most likely point and by calculation correct its error The formula is :—

$$M = A + \left\{ \frac{\leqq Fd}{N} \right\} h \text{ where}$$

M = mean; A = assumed mean ; F = frequency ; D= deviation ; N=number of scores and H=value of steps, In our example.

$$M = 184\cdot5 + \frac{24}{50} \times 10 = 189.3$$

The mean is familiar to everyone and is computed by simple addition and division. It gives weight to extreme variations and every item in the group affects it. If we have the total and the number we could get the mean without the individual measurements, which is not possible with any other type of average But it emphasises the extreme variations, every case should be found before it is determined and may fall on a fictitious category altogether, as when the average size of a family is described as 4·8.

Another measure of central tendency is the *mode*. The true mode is very difficult to compute. Hence the form most used is the *crude mode* which is the most frequent score in ungrouped data. In a frequency distribution it is the class value or midpoint of the interval with the largest frequency. The crude mode should be used only when there are over a 100 cases. Our example is bimodal, the two crude modes being 134.5 and 154.5. This is only accidental.

The mode neglects the extreme variations which may be necessary in certain cases, if they are very few. It is real, so that it is better to say that the daily average wage is 12 annas, instead of 11.9 annas which nobody gets and which it will be, according to the arithmetic mean. The mode indicates the type. But in many cases there may be many types as in wages. Where the extreme cases have to be considered as in an equal distribution of wealth, the mode is not a true measure. No formula can be stated for finding out the mode. It may give a false idea and the multiplication of the number by the mode does not give the actual total.

A third measure of central tendency is known as the mid measure which in its form the *median* has become very popular in statistical studies. The median and the mid-measure should be distinguished. The mid measure is the score of the middle paper of a number of papers arranged in order of the size of their scores. This is not the same as the middle point on the scale of a frequency table of the same scores. The mid measure is therefore used for ungrouped data, and the median for a frequency distribution. The midmeasure is a score, the median is a point. When we are commuting the mean we assumed that all of the cases in the step were concentrated at the mid-point which is said to be its most representative value. In computing the median quite the contrary assumption is made, namely that the cases are evenly distributed through the step. The median is a point on the scale such that 50% of the cases in the distribution are above it and 50% below it.

The median is found in the following manner. The number of cases is divided by 2 to discover, 50% of the

cases. The frequencies are added up from the bottom until a point is reached which will be nearest to half the number of cases without exceeding it. The difference between the half measure and the frequencies already counted, would indicate how far into the next step one should go to get the median, since the number of cases with in this step is supposed to be uniformly distributed within it. The difference divided by the frequencies in the step and multiplied by the value of the class interval should give us the correction to be added to the lowest limit of the step in question. The formula is:—

$$Md = l.l. \left\{ \frac{\frac{N}{2} - F_{up}}{F_{md}} \right\} \times h \text{ or}$$

$$Md = u.l - \left\{ \frac{\frac{N}{2} - F_{do}}{F_{md}} \right\} \times h \text{ when added from the top}$$

Where Md = median. l l. is lower limit of step, f up is the frequency up till the step, fmd is the frequency of the median step. In our example:—

$$Md = 139.5 + \left\{ \frac{25 - 24}{9} \right\} 10$$

$$= 139.5 + 1.1$$
$$= 140.6.$$

The median can be accurately determined and is not easily affected by extreme variations. Unlike the mode, it does not represent a small number of items. But it is difficult to compute, does not give weight to marked variations and in a discrete series, where there are a large number in the modal class, its importance is destroyed.

3. *Measures of Dispersion or Variability.* We have said that the most representative figure in a table is the mean, mode or median. Thus when we say that the mean temperature is 80°, we know that often it is 100° and again it goes down to 60°; but 80° represents the true mean. However, the measure of the central tendencies of two series may be the same and yet the series themselves may vary widely. Take for instance the two series:—(Thurstone. *Elements of Statistics*).

A 5, 10, 15, 20, 25, 30, 35, 40, 45

B. 21, 22, 23, 24, 25, 26, 27, 28, 29

The mean of each series is 25, yet series A scatters more widely and is more variable or has more spread, than series B. Hence for a proper description of any series some measure of the scatter. dispersion and variability is necessary.

The range may be such a measure but it is unreliable since it is affected by the fluctuations of the extreme score. A more reliable measure is the semi-inter-quartile range which is really the range of the middle 50 % of the cases. It eliminates the disturbing influence of the extreme scores. It is called Q and as a distance, is different from the median which is a point on the scale. To discover Q we have to find out Q^1 and Q^3 when Q will be equal to $\frac{Q3-Q1}{2}$ and will contain the middle 50 per cent of the cases. For the frequency distribution the formula for Q3 and Q1 are;—

$$Q3=u.l-\left\{\frac{\frac{n}{4}-Fdo}{F3}\right\}h$$

$$Q1=l.l.+\left\{\frac{\frac{n}{4}-Fup}{F1}\right\}h$$

where u.l. =upper limit of step containing Q3 and
F3 =frequency of step containing Q3.
... l l. =lower limit of step containing Q1.
F1 =frequency of step containing Q1.

In our example:—

$$Q3=159.5-\frac{12.5-6}{11}\times10=153.591$$

$$Q1=119\cdot5+\frac{12.5-8}{5}\times10=128.500$$

$$\frac{Q3-Q1}{2}=\frac{153.591-128.500}{2}$$

$$=\frac{25\cdot091}{2}$$

So Q=12.545.

The Standard Deviation The quartile deviation is sufficient for ordinary purposes; but for research purposes we should have the standard deviation which has some important qualities to recommend it. It is a sort of an arithmetic mean of the deviations from the mean of the distribution. In calculating the standard deviation, each individual deviation from the mean is squared, the sum of these squared values obtained is then divided by the number of such deviations and the square root of the result is then obtained. Therefore "the standard deviation (or sigma σ

as it is usually called) is the square root of the mean of the squares of the deviations from the mean of the distribution''. The quartile deviation takes into account the middle 50% of cases while sigma 68% of the area (68·26 % in a normal frequency distribution). Sigma is calculated about the arithmetic mean. A very significant fact about sigma is that it bears a definite relationship to the curve of the distribution. In a normal frequency curve sigma marks the point where the curve changes from convex to concave. In the case of ungrouped scores :—

$$\sigma = \sqrt{\frac{\Sigma d^2}{n}}$$

Score	d	d^2
21	+4.4	19.36
19	+2.4	5.76
17	+0.4	0.16
14	−2.6	6.76
12	−4.6	21.16

$$\sigma = \sqrt{\frac{53.20}{5}}$$

$$= \sqrt{10.64}$$

$$= 3.26$$

M $= 16·6$ $\Sigma d2 = 53.20$

That is between 3·26 larger than 16·6 and 3.26 smaller than 16·6 approximately ⅔ of the scores are distributed. For a frequency distribution the formula is

$$\sigma = \left\{ \sqrt{\frac{\Sigma Fd^2}{n} - \left(\frac{\Sigma Fd}{n}\right)^2} \right\} h$$

Applying to our example we get:—

$$\sigma = \left\{ \sqrt{\frac{210}{50} - \left(\frac{24}{50}\right)^2} \right\} 10$$

$= (\sqrt{3.9696})\ 10$

$= 19·92.$

Use quartile deviation with median and standard deviation with mean.

When designating a person by his absolute rank, we should mention the number in the group with which he is compared. For example 25th among 25 is not so creditable as 25th among a thousand. There was a boy who boasted that he was always first or second. It transpired that there were only two boys in the class! Without stating the number in the group, the place rank has no meaning. Percentiles are a way of doing this without stating the number that belongs to the group, which is always assumed to be 100. Thus if there are 50 individuals in a group, the middle person will have an absolute rank of 25, but his percentile would be 50. A percentile is so constituted that it indicates the per cent of the group which ranks below it. In computing percentiles for large groups we should distribute the scores in a frequency distribution and use the formula

$$P_p = l.l. + \left\{ \frac{\frac{PN}{100} - F_{up}}{F_p} \right\} h \quad \text{Percentiles counting up}$$

$$P_p = u.l + \left\{ \frac{\left(\frac{100-p}{100}\right) N - F_{do}}{F_p} \right\} h \quad \text{Percentiles counting down}$$

Applying to our example to find the 10th percentile, we have

$$P_{10} = 109.5 + \frac{(5-4)10}{4} = 112.0$$

or

$$P_{10} = 119.5 - \frac{(45-42)10}{4} = 112.0$$

The formula for the cumulative frequency distribution is; $\text{Percentile} = \left\{ \frac{\frac{N}{P} - Cf_{up}}{F_p} \right\} h$ where Cf=Cumulative frequency

To find the percentile rank of any given score use the formula—

$$Rx = \frac{100\left\{F \times (X - l.l) + (F_{up})\, h\right\}}{Nh}$$

To find the rank of 130 in our example—

$$R_{130} = \frac{100\left\{11\,(130 - 129.5) + 13 \times 10\right\}}{50 \times 10}$$

$$= 27.1$$

130 has a percentile rank of 27.1

Correlation simply means a going together and so establishes a kind of relationship between two series of

events. Thus if, year after year we find scarcity of water and cholera going together, we say there is a correlation between drought and cholera. Thus age and height; attendance and school rank; intelligence and success in lessons; intelligence and physical well being, are all correlated one with the other. This going together may not establish a causal relation but there is a strong presumption to suspect such a relationship. Correlation is very useful in educational studies. If pupils who score high in mathematics invariably score low in English, we may infer that mathematical and linguistic abilities do not go together. But if we discover that the scores of children show some correspondence as between language and history, we could speak of a positive correlation between language ability and ability in history. "Correlation is a method of determining the correspondence and proportionality between two series of scores or measures for the same pupils, or the same schools, or the same cities, or any other entity." The correspondence is expressed in the form of a co-efficient, as a decimal of unity which may be either positive or negative. When two series of scores increase or decrease together we have positive correlation. When one series decreases as the other increases or *vice versa* we have negative correlation. A scatter diagram will show correlation in a graphic manner.

The method of correlation is very useful in education to test the reliability of tests, their agreement with an outside standard, their validity and usefulness in life, and in research purposes of all kinds. Therefore a method of computing correlation co-efficients should be known to teachers. Two methods are commonly used for the purpose—the product moment method and the method of ranks popularised by Spearman. The formula for the product moment method is:—

$$r = \frac{\Sigma xy}{\sqrt{\Sigma x^2 \, \Sigma y^2}}$$

Where r is the correlation co-efficient

x is the deviation from the mean of one set of scores

y is the deviation from the mean of the other set of scores

The other formula called Spearman's foot-rule is

$$r = 1 - \frac{6 \, \Sigma d^2}{n(n^2-1)}$$

Partial correlation is the name used for describing the influence of an unsuspected third factor. There was a correlation between size of vocabulary and amount of foreign language learnt and it was .58. But there was a correlation between age and size of vocabulary. When the influence of age was allowed for, the first correlation coefficient diminished to ·44· Multiple correlation may exist between three factors. A boy's intelligence may correlate with his scholarship to the extent of ·44 and his English score correlated with scholarship only ·37. What will be his success in college? By making a composite of the first two variables and correlating it with the third the correlation coefficient becomes. 51 If the correlation between the second and third variable is smaller than the correlation of each with the first variable, we may say, there will be an increase in the multiple correlation

Educational age. The E A for any particular test is an age standardisation for the ages for which the test is most useful. There are as many E A's as there are subject tests such as reading age, arithmetic age, geography age. An E A of 8 means that in any one particular subject, a certain child is achieving what is common to children of 8. The EA becomes more and more unreliable as we ascend up the higher classes which are highly selected groups. The E A should not therefore be used in the high school. We have also an educational quotient or E Q which is the educational age divided by the chronological age. An E Q of 100 is normal, any E Q above 100 is superior and any below 100 is inferior. An EQ tells us when a child is working to its limit or when dawdling. An inferior E Q often means poor intelligence or bad grading.

Mental ability and educational achievement. The intelligence test is for finding out how much a child could achieve. The educational test is to find out how much the child has achieved. Intelligence tests may include test items similar to those of educational tests but they are general in nature, whereas educational tests measure specific functions which are the results of teaching. The intelligence test is essentially prognostic. It looks to the future and predicts what a child with any particular I Q will achieve. This is its most important characteristic and if the educational test should yield up its full significance, it should be measured up against the I Q and then only we could say whether a child is working up to capacity or not. This is done by calculating its achievement quotient or A Q. The A Q is based on the I Q and the E Q. The child of a particulcr I Q

is expected to have a corresponding E Q. The ratio of E Q to I Q is called A Q. $A\ Q = \frac{E\ Q}{I\ Q}$. If E Q's and I Q's are similar we shall have A Q's near 100, if the E Q is smaller, AQ will be less than 100, if E Q is greater A Q will be more than 100. In this way the A Q will be diagnostic of pupil endea. vours. But such techniques should be cautiously handled since they are based on data whose reliability is not above suspicion,

There are six general uses of tests:—survey and inventory purposes, measuring the efficiency of instruction, sectioning and promoting, diagnosis of individual peculiarities, motivation and research. (1) Tests are an essential part of school surveys. To compare one school system with another a battery of tests is used and the averages are compared with other averages and with norms and standards. Survey tests need not be long and detailed and composite tests will serve the purpose equally well.

2. To test the efficiency of instruction educational tests are a more objective method than the impressionist method followed by school inspectors, To judge a teachers's efficiency in instruction by dropping into his class, is to lay such judgments open to the effects of a multitude of factors which would diminish their reliability. Here we should check the result of educational tests with intelligence test scores, for otherwise a high educational achievement may only mean a higher intelligence and not good teaching,

3. In large schools where there are many divisions in the same class, educational tests would be useful for the purpose of sectioning the class. Since a homogeneous group makes a more rapid progress, such groups could be secured through the use of educational and intelligence tests. Fast moving and slow moving sections could be formed. Test results could be used for promotions and for grade placements.

4. Tests help diagnosis of individual peculiarities. The teacher should know the special difficulties of individual pupils. The more scientific and detailed is a test the more useful is it for this purpose. Dr. Gates' tests are good instances in point. Test A has reference to the power to appreciate the general meaning of a paragraph. Test B tests the power of reading to predict the outcome of given events. Test C values the power of reading to understand

to note details. By this battery of tests we discover in which part of the reading process, there is defect.

5. Test scores make for motivation. Pupils could make their own learning curves and the knowledge of their educational position, would spur them on to better work. Nothing succeeds like success. Once they succeed pupils get confidence in their own powers. Working against their own scores in this way, is better than running rivalry with other pupils.

6. Tests are used for research work in education. They are needed to equate groups for experimental purposes, to measure progress, and to judge the effectiveness of new methods. It is the perfection of tests that has greatly facilitated educational experimentation.

There are two kinds of tests—General or Composite and Special tests.—General tests cover a number of school subjects and give a general picture of a child's educational achievement. Examples are the Stanford Achievement Test, Pintner Educational Survey Test, The Iowa High School Content Examination. Each subject has one or more well-known test, which is special to it.

Mathematics—Courtis' Standard Research Tests
Woody Arithmetic Scales
Woody McCall Mixed Fundamentals
Buckingham Scale for Problems in Arithmetic
Holtz First year Algebra Scales
Columbia Plane Geometry test

Reading—Thorndike McCall Reading Scales
Monrœ Standardised Silent Reading test
Gray Oral Reading tests
Gates Reading tests
Thorndike Test of Word Knowledge

Handwriting—Thorndike Scale
Ayres Scales

Spelling—Morrison—McCall Spelling Scales
Iowa Spelling Scales
Brigg's Scales

English—Hillegas Composition Scale with the Thorndike extension

Van Wagenen English Composition Scales
The Wilson Language Error test
Charters Diagnostic Language test
Kirby Grammar test
Abbot-Trabue Exercises in Judging Poetry

Geography—Gregory—Spencer Geography test
Posey-Van Wagenen Geography Scales

History—Barr Diagnostic tests

Science—Ruch-Popenhoe Science test
Powers Gencral Chemistry test
Ruch-Cossmann Biology test
Iowa Physics test-

INTELLIGENCE TESTS.

Ballard : Mental Tests.
Freeman : Mental Tests.
Termrn : The Measurement of Intelligence.
Adams : Modern Developments Chap. 2 and 3
Fraser : Psychology of Education Chaps. 2 aud 3
Pintner : Intelligence Testing.

The scales of attainment are to measure the product; but there are reasons why we should measure the qualities of the mind that gives rise to these products. Every artificer likes to know the material with which he works. This is particularly true of the teacher's profession. The teacher should know his pupil well. Till now there were more or less tacit classifications of the pupil's mind such as dull, bright, very bright etc This informal and approximate measurement of pupil capacity would certainly be better for being made more accurate and quantitative. Intelligence tests propose to do this function. If we gather statistics of the progress of school children through the several grades of the school, we shall discover that a large proportion of them had been retarded at least one year in one of the classes, many of them in two classes, some others two years in the same class and so on. So that a proportion of the money spent on education has been spent in reteaching children, what they had already been taught and failed to learn. This state of affairs has been attempted to be remedied by individualising instruction, by improved methods of promotion and by increased attention to children's health But the chief defect has been, that there are individual differences in mental endowment and school instruction should take note of these. No ungraded class will suffice; for the boys once they fail, acquire the habit of failing. They should be at once mentally tested to know the cause of the failure. This is what the intelligence tests propose to do.

There is a proportion of school children who might be called defectives or feeble-minded. It was to discover these that the tests were originally devised These require special treatment. To make them go through the usual school curriculum is to be cruel. They are not fit for it and the curricula should be differentiated to suit their limited mental capacities. Two percent of school children belong to what is called the moron grade. They would never grow beyond the intelligence which is normal to children between 11 and 12 years of age and would not reach the normal adult

intelligence. To spend time and energy in training them, is sheer waste. Nowadays it has been discovered that delinquency and criminal leanings are the results of mental deficiency. 25 % of criminals have on investigation been proved to be mentally weak. Hence intelligence tests would be able to tell us, which are mentally weak and which would drift toward crime in later life.

While there is a small percentage of school children, who are distinctly feeble-minded, there is also a small percentage who are distinctly superior. To herd these with the rest is to stultify their minds. Mr. Fraser mentions two cases. In one a boy was found to be most mischievous in his class and a source of annoyance. He was tested and discovered to be of a superior sort. He was promoted to a higher class which gave his powers enough to do, and nothing much was heard about his mischief. Another boy of 8 was discovered to have the same intelligence as one of 12, and he found his work with the ordinary class a great bore. Hence he was promoted to a higher class; but here he was looked upon as a baby and teased by everyone. He was therefore removed from the school and placed under private tuition. He has already read Wells' *Outlines of History* and can give the most scientific explanation for certain phenomena. We have seen that one of the defects of class teaching is that all sorts and conditions are lumped together in a class, and that class teaching achieves its purpose best when the grading of the pupils is best. If the work is adjusted to the capacities of the average child, bright ones are idle and the poor ones puzzled. If it is suited to the brightest or the poorest the effect is still worse. Thus a classification according to the chronological age is bound to be unsatisfactory. Intelligence tests would enable us to secure a class of a uniform intelligence. A class having a uniform intelligence quotient is bound to make very rapid advance.

That reminds us, we should explain what Intelligence Tests are, and what is meant by the Intelligence Quotient or the I. Q. as it is usually written. The Paris authorities required that the defectives among school children should be separated, and asked for a method of determining who were defectives. Professor Alfred Binet took the matter up, and devised a number of tests which should prove who were normal and who were not. He devised certain questions, some involving knowledge, others involving memory, others ingenuity and so on through the faculties and he got them

answered by school children. A question which could be answered by about 70% of school children of a particular age was considered a question which any normal child of that age was capable of answering. In this way he arrived at a number of test questions for each age. Those who can answer the questions set for a higher age are superior, and those who could answer questions set for a lower age only, are looked upon as inferior. A difference of two years (of retardation) between the chronological and the mental age was looked upon as showing feeble mindedness in children below ten, while a similar difference of three years, was said to signify feeble mindedness in children over ten Binet perfected his tests by repeated revisions and after his death they were taken up by Prof. Terman of Leland Stanford University, California and systematised. Binet's tests only showed whether one had the same mental age as chronological age or not. They did not give us the method of measuring the deficiency or the surplus. This was made possible by Prof. Terman's idea of an Intelligence Quotient. Prof. Terman achieved this by giving a time value to each test and by arranging them in a symmetrical scheme.

Six tests for each year from 3 to 10, each test being worth 2 months.

Eight tests for the 12th year, each test being worth 3 months.

Six tests for the 14th year, each test being worth four months.

Six tests for the average adult, each test counting for six months.

Each boy was first given the age in which he can answer all the tests adduced. Then he was given the value in months of each test he answered in a higher age. Suppose a boy of 12 is able to perform all the tests for the tenth year. Then his mental age is ten to start with. Supposing he is able to perform 2 in the 12th, he gets 6 months to his credit and suppose he does one of the 14th, he gets an additional 4 months. If he does another of the average adult, he gets 6 months more. Thus his total mental age is 11 years, 3 months. Now the Intelligence Quotient is $\frac{\text{Mental Age}}{\text{Chron. Age.}}$ in this case it is $\frac{11{\cdot}25}{12}$ or 94. To avoid decimals we make the standard 100 instead of 1. Thus the I Q of this boy is 94. On the basis of the I Q people are classified in the following manner.

I Q	*Classification*
Above 140	Near Genius or Genius
120—140	Very Superior Intelligence
110—120	Superior Intelligence
90—110	Normal or Average Intelligence
80—90	Dullness
70—80	Border line deficiency, moron
Below 70	Feeble-minded

The first and the last class have only a few, while the majority are in the middle classes. 1. These classes are not scientific but quite arbitrary ; but they are so cautiously chosen that they have been justified by other attendant circumstances. 2. Another defect is that the tests will take too long a time to apply. Each boy may take about half an hour. This is why they are trying to evolve group tests by which a large number could be tested at one and the same time. 3. A criticism usually levelled against the test is that we do not know what intelligence is and there fore, we could not measure it. Intelligence is capacity as against content. How can we measure capacity without content ? Some, therefore take knowledge as part of intelligence, others measure specific abilities, because they say that an intelligent man is intelligent in everything and that intelligence is the superior directive force of the mind. Therefore to measure intelligence, is to measure specific abilities. But Terman says, that it is not neccessary to know what intelligence is, in order to measure it. We measure electricity without knowing what it is. 4 Some say that the subjective element is not altogether eliminated, the results arrived at differing with different people who apply the test. This is not absolutely true. The subjective element has been eliminated to a great degree and the tests are mainly objective in character This is shown by the fact that a boy's intelligence quotient remains constant throughout his life.

Intelligence tests have come to stay and it is not possible to thrust them aside by prurient criticism. They are proving useful in every walk of life. They were applied on an extensive scale in the American Army. They are being used to select people for industrial undertakings, and they are being used to measure social phenomena of all kinds. Hence they are soon likely to play a very important part in social life.

Home Work.

The amonnt of Home work to be given and the kind are matters of debate. Boys had already had an exhausting day at school and to give them further work to do at home instead of allowing them to prepare and revise their lessons and to spend their time in recreation and play, is to court fatigue. It is not likely that there are facilities for working in many Indian homes. Pupils have, in very many cases to work at these exercises unaided, without help from parents or other teachers. Under these circumstances the setting of too much home work is a practice of doubtful advantage. Hence it is contended, that the amount should be strictly rationed even though it need not be stopped altogether, because it corresponds to the step application. The lowest three classes might be given enough preparation to last them one hour, the middle classes might be given work, which wouid last them one and a half hours. The highest two classes might be given work, which would last them two or two and a half hours.

The following should be held in view in assigning home work. 1. Home work should be used to develop the tastes of individual children and so they may even be in the nature of hobbies. 2. It should be of such a nature as not to require the assistance of any one. It may be continuation of the work done in the school, devised to make that work better impressed on the mind. In no case should the father and mother be reduced to the role of school assistants. 3. Home. work should be very definite. There should be only one way of its being correct. If the assignment is vague, each pupil might write what he likes about it and this would take too much time to correct. The answers required should be uniform. No such exercise as "write me an account of what has been said today," should be assigned. 4. The exercise must admit of ready correction. Those exercises are good which can be corrected by the pupils themselves. This can be so, if the answer required is of a definite kind. 5. Exercises should be supplementary rather than preparatory. It is unfair to expect pupils to break new ground in any subject. That should be done in class. 6. Home-work should be rigidly collected and corrected. 7. It should not be of a mechanical nature such as the copying of notes given in class. 8. It must not be work of a nature that will give rise to the vice of copying. 9. Home work (*a*) provides the "practice" for which school hours leave no time (*b*) forges an additional link between school and home (*c*) Fosters self-reliance and encourages the habit of private study.

Time Tables

This topic had been partly dealt with under fatigue. The time-table is very necessary. It is the second school clock, on the face of which are shown at intervals, the hour of the day, the kind of lesson in progress in every class, the recreation interval, and the moments for assembly and dismissal. Strict adherence to this pre-arranged plan of study, promotes the formation of habits of order, regularity and steadiness of purpose which are the secrets of successful work. By means of the time table, we are able to see that each subject gets its proper allotment of time, and is not neglected. It also prevents waste of time, by making definite what we shall do at stated times, and what we shall not do. The school time-table should show precisely the hours between which lessons are given, the exact time set apart for religious observances, the marking of the roll, recreation, and any other exercise which though regularly recurring does not rank as an ordinary lesson. It should show who is to give the lesson, and the place where it is to be given, unless such things are well understood. The time-table need not show the time allotted for the sub-branches of a subject. That is, if we allot ten periods to English, we shall leave it to the teacher to decide how many periods he shall give, to composition and how many to text.

A matter of great importance in connection with the time-table, is the distribution of the time among the various subjects. Each subject should be given the time suited to its importance which is decided by the tradition of the schools and the future needs of the pupils. The second point to be considered is the relative difficulty of the subjects Thus more time has to be given to English not because it is more important but because it is more difficult. The third consideration is that when a subject is newly started, it requires more time given to it. The question of the length of the lessons has been adequately dealt with, under fatigue. The length of each individual lesson should be decided by having regard to :—a) The comparative importance or difficulty of the lesson. A difficult lesson should not be too long (b) Whether it is theoretical or practical. A practical lesson, such as a lesson in chemistry may even require a double period (c) the age and powers of the scholars. Forty minutes form a good minimum. The succession of lesson should also be considered. The difficult lesson and the easy

should be given for the difficult lessons; evening periods for the easy ones. Mechanical lessons would give relief from lessons exercising the mind. The convenience of the staff should also be taken into account. The lessons that each teacher has to give, should not follow hard on the heels of one another. The structure of the building would also decide the succession; for if there is only one science room, classes should have to bide their chance for it. The time-table should also be so arranged as to provide movement and change of position at each pause in the work. Provide a games period every week if possible; in which case it would be easy to gather the staff for meetings and the pupils themselves for a general talk.

Parental Co-operation

The great evil in Indian Schools is that it is difficult for the teacher to come into touch with the parents, so that home and school do not often co-operate with each other in the education of the pupil. This is due to the fact that the parents are mostly poor and ill-educated. The new methods introduced into the school do not win their approval. Even the ordinary methods are often beyond their comprehension. Very often they unjustly condemn the teacher and his methods, and in many cases they put stumbling blocks in the way of the teacher achieving his purpose. They do not see that their children attend the school regularly. They think that attendance at school is not so important as doing some petty "private business." The children are not sent to school on the re-opening day, but often a week later. Wedding ceremonies, funeral ceremonies and pilgrimages consume a great deal of their time. The parents are often against games as the device of Satan. They should on the other hand, see that the physical welfare of the boy is a matter of even greater importance than his intellectual progress. The parents should see that much of the good work done in school, is not spoilt by boys being allowed to keep bad company outside. The parent should also take every opportunity to come into touch with his son's headmaster and teachers and to discuss with them his progress and standing

The teacher and headmaster should try every means in their power, to come into touch with the parents of the pupils. This should not prove as great a difficulty now as before, because the present generation of parents is certainly better educated than its predecessors. First of all no boy should be admitted to the school who is not

brought by the father in person. Next the headmaster having admitted the boy should tell the parent, of the system by which the school kept in touch with the home, and request that he should view the school report and endeavour his best to co-operate with the school. Then the headmaster should introduce him to the boy's class teacher. The headmaster should provide opportunities for the parents to visit the school. This could be done by organising frequent gatherings such as prize distributions, magic-lantern entertainments, lectures, sports and matches, during which the staff might meet and talk with the parent. Another means of promoting communion between home and school is by keeping open session. On an appointed day the school begins earlier and all parents are invited. They see the school at work, get to talk with the masters and see their children's records. Then at about nine, the boys are sent home and the headmaster and teachers meet the parents in the common hall. The questions which had been previously submitted by the parents are discussed freely, and the headmaster tells them whatever he wants to communicate. The most customary form of communication between home and school is the progress report. In some schools this is sent once a week. That would entail great clerical labour, Hence the terminal report is considered sufficient enough. The parent must sign the report and send it back. We have already discussed the form which such reports should take. Now-a-days parental co-operation takes the form of a parent teachers association. It arose in Chicago in 1884 and assumed national proportions in 1887. It is an offshoot of the National Congress of Mothers and is still that in its national organisation which has its headquarters in Washington and watches over the interests of children. In its local organisation it takes the form of a parent teacher's association. The national and state associations bring to the mind of people constructive progressive ideas in education and the local associations lend their support to carrying them out. It is a social gathering which takes up the study of children and tries to better the conditions under which children are growing up. Its objects are to understand the aims and plans of education, to know the local school and to help it forward where needed, to link school and community, to put the teachers into touch with the best people of the place and to secure political support for the right kind of school. The Parent-Teachers association should have a dual programme a study programme and a work programme. It should study the problems of child education and carry out the plans for

School Tone And Esprit de corps

Raymont: Principles Chap. XIX.
Wren: Indian School Organisation Chap. XVII.

It is very difficult to define school tone. We can say what it is, only by describing its component parts. It is often the child of good discipline. But it is by no means identical with it. There were schools such as Dotheboys Hall which had good discipline, but no tone. Good discipline might be produced by the strict enforcement of rules. There are other schools, where the tone is excellent as in some schools of America, but where the discipline is not good. There is no denying the fact, however, that the better the tone the more easy it is to secure discipline for discipline is most advantageously enforced by the school tone. Tone depends upon the ideals of the school, the prestige of the headmaster and the staff; the wise, fine and delicate management; and the high order of educational endeavour.

The chief ingredient in school tone is *esprit de corps* or the common spirit. If this spirit exists side by side with school pride, it would be possible to raise the school tone immensely. This depends upon what is known as the psychology of the crowd. We all tend to function in groups and not as individuals. These groups have common characteristics. We have very often, said that a man is partly made by the group to which he belongs. There is the common tradition to which he has to suit himself. As we grow we develop the traits of the groups to which we belong. This growth is helped by what we know as the sympathy of numbers, and the psychology of the crowd. A large number of people brought together, learn things easily and they tend to be welded into a group of one pattern which can function as a unit. The school is also one such group. The boy who is introduced to the school soon absorbs the current slogans and the marks of the school. He does as his mates do, and comes to have a character determined by the school atmosphere. This atmosphere is determined by the character and attainments of teachers, the dominating personality of boys, but above all by the school traditions. Therefore if we determine the atmosphere of the school, we more or less determine the character of the scholars who tend to absorb the prevailing spirit. This spirit is more common in boarding schools than in day schools, more common in schools having a long history than in schools of recent foundation, more common in schools in

which a pupil studies for a long period than in one where he studies for a short period; more seen in schools that belong to a better grade of society than in those which belong to a lower grade; more seen in schools whose pupils have an opportunity of distinguishing themselves later in life than in those where there is no such opportunity.

These considerations indicate the means by which *esprit de corps* can be fostered. 1. Models are easily followed. Therefore the teachers and prefects should place before the pupils high forms of social behaviour. 2. Imitation is not the only resource, emulation works equally well. It has been found that *esprit de corps* has been fostered by the house system and the system of consulting masters. This is achieved by means of rivalry between these groups. Within limits, therefore, class emulation should be allowed. It has none of the objectionable features of individual emulation. In attendance results and athletic records, each class might compete with the other and the whole standard of the school might be raised. 4. The instinct of imitation begins to be operative, whenever the whole school is brought together. Therefore the School Day, the School Assembly, the School Procession, School bands, School badges, and prize-distributions help the growth of the common spirit. 5. The records of former students give pride to the school, and these should be brought and kept in prominent places. 6. The school scholarship record and athletic record, foster a similar feeling. 7. Anything that brings old boys and present boys together helps. This is how a school magazine may be of the greatest use. 8. When the school is taking part in public tournaments the boys belonging to it should be arranged in one place and this will help to infuse the common spirit.

BIBLIOGRAPHY.

Adams J: The New Teaching (Hodder).
" Modern Developments in Educational Practice
" Student's Guide (University of London Press)
" Errors in School.
" Educational Movements & Methods (Harrap).
" Evolution of Educational Theory (Macmillan).
" Herbartian Psychology (Heath).
" Exposition and Illustration (Macmillan).
" Everyman's Psychology.
Adamson J E: The Individual and the Environment
Adamson: The Practice of Instruction (Nat. Soc. Dep.).
Averill A: Psychology for Normal Schools (Houghton).
Bagley W C: The Educative Process (Macmillan).
" Classroom Management (Macmillan).
" Discipline (Macmillan).
" Education Crime and Social Progress.
" Craftsmanship in Teaching (Macmillan).
" Educational Values (Macmillan).
Ballard P B: The Changing School (Hodder).
" The New Examiner (Hodder).
" Mental Tests (Hodder).
" Group Tests of Intelligence (Hodder),
" Thought and Language
Barnett P A: Teaching and Organisation (Longmans).
Betts G H: The Mind and its Education (Appleton),
Bode B H: Modern Educational Theories (Macmillan Coy.)
" Fundamentals of Education (Macmillan Coy.).
" Conflicting Psychologies of Learning.
Boyd C: From Locke to Montessori.
" Towards a New Education.
Bray: School Organisation (University Tutorial Press).
Burnett T J: Essentials of Teaching (Longmans).
Childs: Education and the Philosophy of Experimentalism (Appleton).
Cole: The Technique of Teaching.
Clarke: The Art of Straight Thinking.
Cook C: The Play Way (Heinnemann)
Colvin S S: The Learning Process (Macmillan).
" Introduction to High School Teaching (Macmillan),
Claparede: Experimental Pedagogy (Arnold).
Dexter G & Garlick H: Psychology in the Classroom
Dewey John: How we Think (D. C. Heath).
" School and Society (Blackie).
" The School and the Child (Blackie)
" Educational Essays (Blackie)
" The Child and the curriculum (Blackie)
" Interest and Effort in Education (Houghton Mifflin)
" Democracy and Education (Macmillan)
Dewey, Evelyn: The Dalton Laboratory Plan.
Dumville B: Fundamentals of Psychology (University Tutorial Press)
" Teaching its Nature and Varieties (University Tutorial Press)
" How To Teach

Findlay J J: Principles of Class Teaching (Macmillan)
„ Principles of education 2 Vols. (Longmans)
Fitch Sir J: Lectures on Teaching (Camb. Univ. Press)
Fox: Educational Psychology (Camb. Univ. Press)
Glover: Know your own Mind (Blackie)
Horne H H: Philosophy of Education (Macmillan)
„ Psychological Principles of Education (Macmillan)
James William. Talks to Teachers (Longmans)
Jones W. F.: Principles of Education (Macmillan)
Jordan: Educational Psychology
Kandel I L. History of Secondary Education (Harrap)
„ Comparative Education
Kilpatrick W H: Foundations of Method (Macmillan)
„ Source Book for a Philosophy of Education
„ Education for a changing civilization (Macmillan)
Kimmins: The Triumph of the Dalton Plan
La Rue: Psychology for Teachers (American Book Coy.)
Lyster R A: School Hygiene (University Tutorial Press)
Lloyd-Morgan: Psychology for Teachers
Lynch: Individual Work and the Dalton Plan (Bell)
„ Rise and Progress of the Dalton Plan (Bell)
Macnee J. Instruction in Indian Secondary Schools
(Oxford University Press)
Mckee: New Schools for Young India (Association Press)
Mckown; Extra curricular activities. Macmillan
Norwood: The English Tradition in Education
Nunn P: Data and First Principles of Education. Arnold
O'Shea: The child his nature and his needs
Parkhurst H: Education on the Dalton plan. Bell
Pintner E: Educational Psychology. H. Holt
Raymont T: Principles of Education. Longmans
„ Education
Ross: Groundworks of Educational Psychology. Harrap
Ruediger W C: Principles of Education. Houghton Miffln
„ Teaehing Procedures Harrap
Russell B: On Education. George Allen
Rusk. R.: Infant Educations Univ of Lond Press
Sandiford P: Educational Psychology
Sleight: Organisation and Curricula. Arnold
„ Methods and processes
Spearman: The nature of Intelligence and the Principles of cognition:
„ The Abilities of Man
Strayer G D; Brief course in the Teaching Process
Strayer and Norsworthy: How to Teach. Macmillan
Strong E K: Introductory Psychology for Teachers
Warwick and York
Sturt and Ogden: Modern psychology and Education. K. Paul
Sully: Handbook of Psychology for Teachers. Longmans
Thayer V T: Passing of the Recitation. Heath
Thomson: A Modern Philosophy of Education.
Allen and Unwin
Thorndike: Principles of Teaching Seiler New York
„ Educational Psychology 3 Vols, Teachers College
„ Human Learning.
Tiegs: Tests and measurements for Teachers

Welton J: Psychology and Education. Macmillan
" Logical Bases of Education. Macmillan
" Principles and Methods of Teaching. University Tutorial Press
Whitley: Psychology of childhood
Woodburne: Human Nature and Education. Milford
Woodworth: Psychology. Methuen
Wren P C; Indian Teacher's Guide. Longmans
" Indian School organisation. Longmans
The Teachers Encyclopedia
The Cyclopedia of Education Ed. by Paul Monroe Macmillan